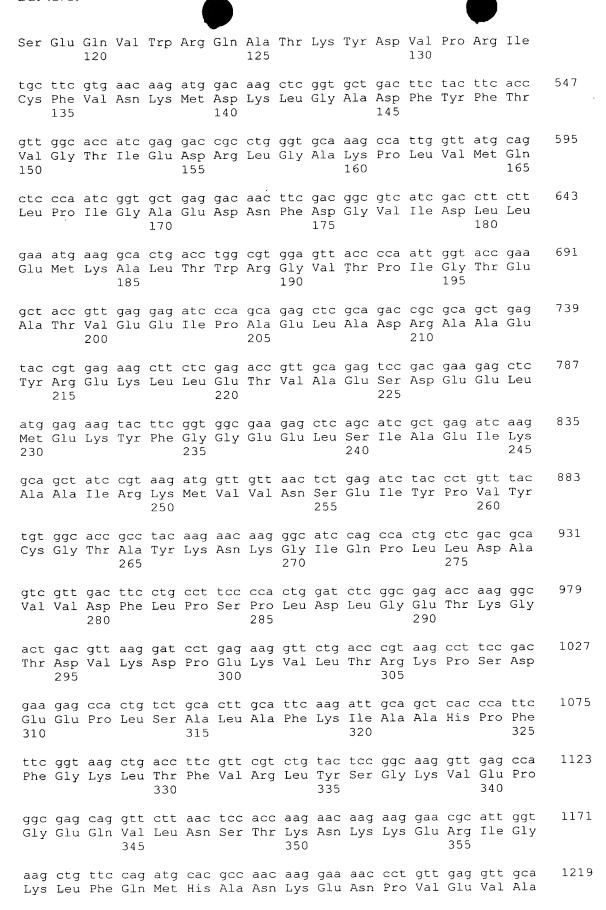
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925

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Lys

1965

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Leu Phe Arg Pro Val Gly Gln Ala Gly Met Pro Asp Met Thr Thr Leu 100 105 110

Met Pro Glu Leu Glu Glu Met Ala Asn Arg Trp Val Glu Tyr Gly Val 115 120 125

Ile Thr Glu Glu Gln Ala Asn Ala Ser Leu Glu Glu Met Asn Thr Ala 130 135 140

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Pro Val Thr Val Ser Ala Thr Pro Met Asp Glu Pro Ala Asn Ser Ile 165 170 175

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Arg Gln Ser Thr Asp Pro Thr Val Gln Ile Ala Ala Ser Ser Leu Met 195 200 205

Gln Cys Thr Thr Asp Glu Met Asp Pro Leu Ala Gly Thr Asp Asp Pro 210 220

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Ala Arg Leu Thr Gly Asn Glu Ile Asp Thr Asn Arg Pro Ile Thr Gly 260 265 270

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624

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Ser	Gly	Ala	Ser	Val 85	Val	Ala	Asp	Gly	Asn 90	Thr	Leu	Val	Ile	Thr 95	Val
Pro	Gly	Glu	Asn 100	Thr	Ala	Gln	Ala	Gln 105	Ser	Leu	Gly	Gln	Thr 110		Gln
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Glu	Pro	Val	Thr		Ser	Ala	Thr	Pro 185		Asp	Glu	Pro	Ala 190		n Ser
Ile	Glu	195		Gln	Arg	Arg	Gln 200		Ile	Thr	. Asp	Met 205		ı Arç	g Thr
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His Ala Lys Asn 50	Ala Ala A	Ala Asp 55	Lys Ala		hr Asp 60	Asn S	Ser S	Ser					
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Glu Ile Tyr Ser Glu Arg Leu Ser Asp Glu Asp Val Glu Lys Ala Arg 115 120 125

Leu Ala Ile Tyr Glu Glu Tyr Gln Pro Leu Asn Ser Glu Gly Gln Pro 130 135 140

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Ala Glu Gln Ala Asn Leu Ala Val Asn Gln Thr Phe Met Arg Ser Ile 260 265 270

Ser Thr Thr Ile Ile Ser Ala Leu Pro Ile Ile Ala Leu Met Val Val 275 280 285

Ala Val Trp Met Met Gly Val Gly Thr Leu Lys Asp Leu Ala Leu Ile

295

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BGI-127CP

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Pro Val Gln Ser Gln Ala Val Leu Arg Leu Ile Glu Gly Asp Val Val 85 90 95

His Met Ala Thr Gly Glu Gly Lys Thr Leu Val Gly Ala Met Ala Ala 100 105 110

Thr Gly Leu Gly Leu Met Gly Lys Arg Val His Ser Ile Thr Val Asn 115 120 125

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Phe Phe Gly Leu Ser Val Ala Ser Ile Ser Glu Lys Met Asp Ala Gly 145 150 155 160

Glu Arg Arg Gln Ala Tyr Lys Ala Ala Ile Val Tyr Gly Pro Val Asn 165 170 175

Glu Ile Gly Phe Asp Val Leu Arg Asp Gln Leu Ile Thr Arg Arg Glu 180 185 190

Asp Ala Val Gln His Gly Ala Asp Val Ala Ile Ile Asp Glu Ala Asp 195 200 205

Ser Val Leu Val Asp Glu Ala Leu Val Pro Leu Val Leu Ala Gly Asn 210 215 220

Gln Pro Gly His Ala Pro Arg Gly Lys Ile Thr Asp Val Val Arg Ser 225 230 235 240

Leu Lys Glu Asn Asp Asp Tyr Thr Ile Asp Asp Asp Arg Arg Asn Val\$245\$ 250 255

Phe Leu Thr Asp Lys Gly Ala Ala Lys Leu Glu Gln Gln Leu Gly Ile 260 265 270

Ser Ser Leu Tyr Asp Asp Glu His Val Gly Ser Thr Leu Val Gln Val 275 280 285

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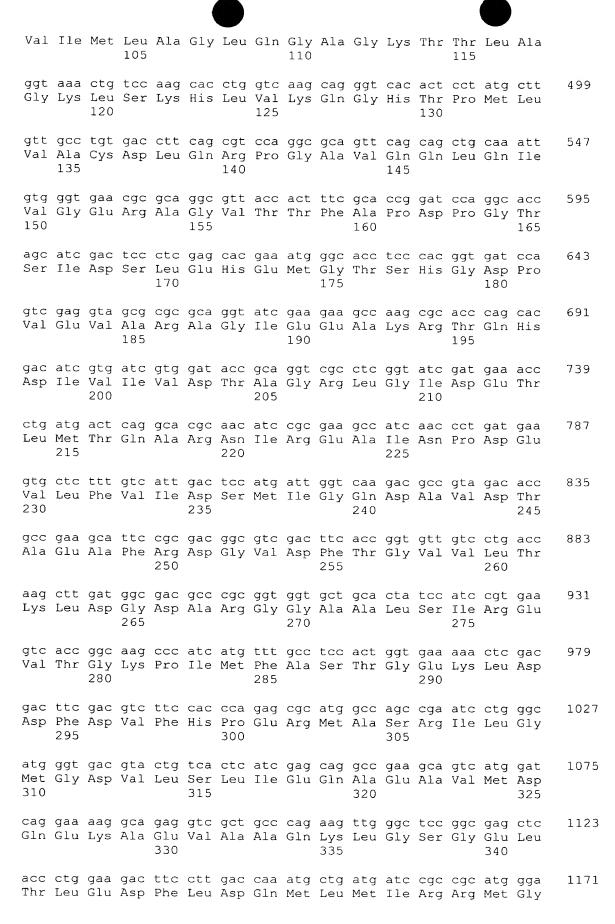
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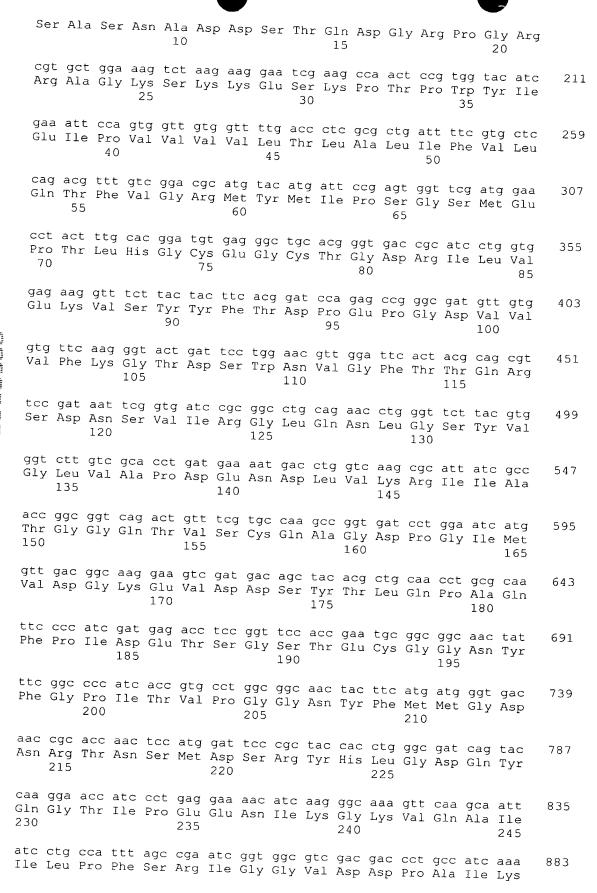
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- Ser Gln Ala Leu Asn Pro Ala Gln Gln Val Ile Lys Ile Val Asn Glu 65 70 75 80
- Glu Leu Val Gln Ile Leu Gly Gly Glu Thr Arg Arg Leu Ser Leu Ala 85 90 95
- Lys Asn Pro Pro Thr Val Ile Met Leu Ala Gly Leu Gln Gly Ala Gly 100 105 110
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- Gln Gln Leu Gln Ile Val Gly Glu Arg Ala Gly Val Thr Thr Phe Ala 145 150 155 160
- Ser His Gly Asp Pro Val Glu Val Ala Arg Ala Gly Ile Glu Glu Ala 180 185 190
- Lys Arg Thr Gln His Asp Ile Val Ile Val Asp Thr Ala Gly Arg Leu 195 200 205
- Gly Ile Asp Glu Thr Leu Met Thr Gln Ala Arg Asn Ile Arg Glu Ala 210 215 220
- Ile Asn Pro Asp Glu Val Leu Phe Val Ile Asp Ser Met Ile Gly Gln 235 230 235
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- Gly Val Val Leu Thr Lys Leu Asp Gly Asp Ala Arg Gly Gly Ala Ala 260 265 270
- Leu Ser Ile Arg Glu Val Thr Gly Lys Pro Ile Met Phe Ala Ser Thr 275 280 285
- Gly Glu Lys Leu Asp Asp Phe Asp Val Phe His Pro Glu Arg Met Ala 290 295 300
- Ser Arg Ile Leu Gly Met Gly Asp Val Leu Ser Leu Ile Glu Gln Ala 305 310 315 320
- Glu Ala Val Met Asp Gln Glu Lys Ala Glu Val Ala Ala Gln Lys Leu 325 330 335

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Leu Ile Phe Val Leu Gln Thr Phe Val Gly Arg Met Tyr Met Ile Pro 50 60

Ser Gly Ser Met Glu Pro Thr Leu His Gly Cys Glu Gly Cys Thr Gly 65 70 75 80

Asp Arg Ile Leu Val Glu Lys Val Ser Tyr Tyr Phe Thr Asp Pro Glu 85 90 95

Pro Gly Asp Val Val Phe Lys Gly Thr Asp Ser Trp Asn Val Gly 100 105 110

Phe Thr Thr Gln Arg Ser Asp Asn Ser Val Ile Arg Gly Leu Gln Asn 115 120 125

Leu Gly Ser Tyr Val Gly Leu Val Ala Pro Asp Glu Asn Asp Leu Val 130 135 140

Lys Arg Ile Ile Ala Thr Gly Gly Gln Thr Val Ser Cys Gln Ala Gly 145 150 155 160

Asp Pro Gly Ile Met Val Asp Gly Lys Glu Val Asp Asp Ser Tyr Thr 165 170 175

Leu Gln Pro Ala Gln Phe Pro Ile Asp Glu Thr Ser Gly Ser Thr Glu 180 185 190

Cys Gly Gly Asn Tyr Phe Gly Pro Ile Thr Val Pro Gly Gly Asn Tyr 195 200 205

Phe Met Met Gly Asp Asn Arg Thr Asn Ser Met Asp Ser Arg Tyr His 210 220

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Ile Tyr Ala Thr Asp Trp Cys Pro Tyr Cys Arg Ser Leu Leu Lys Gly

10 15 20

ctc gac ggc caa gag tac gac ctc atc gac gtc gac caa gat gag gaa 211 Leu Asp Gly Gln Glu Tyr Asp Leu Ile Asp Val Asp Gln Asp Glu Glu 25 30 35

gcc ggc gag tgg gtt aag tca gtc aac ggc aac cgc atc gtc cca 259 Ala Gly Glu Trp Val Lys Ser Val Asn Asp Gly Asn Arg Ile Val Pro 40 45 50

acc gtg cgc tac tcc gat ggc acc cac gca act aat ccc cta gct gcg 307
Thr Val Arg Tyr Ser Asp Gly Thr His Ala Thr Asn Pro Leu Ala Ala
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Val Gly Cys Ile Pro Thr Lys Met Tyr Val Tyr Ala Ala Asp Ile Ala

Gln Glu Ile Gln Glu Ser Ala Arg Leu Gly Ile Asp Ala Thr Val Asn

Ser Val Asp Trp Pro Ser Ile Val Ser Arg Val Phe Asp Lys Arg Ile

Asp Leu Ile Ala Gln Gly Gly Glu Ala Tyr Arg Arg Gly Pro Glu Thr 110

Pro Asn Ile Asp Val Tyr Asp Met His Ala Ser Phe Val Asp Ser Lys 120

Thr Ile Ser Thr Gly Ile Ala Gly Gln Glu Gln Leu Ile Ser Gly Thr 130

Asp Ile Val Ile Ala Thr Gly Ser Arg Pro Tyr Ile Pro Glu Ala Ile

Ala Glu Ser Gly Ala Arg Tyr Tyr Thr Asn Glu Asp Ile Met Arg Leu 175

Ala Gln Gln Pro Glu Ser Leu Val Ile Val Gly Gly Phe Ile Ala 185

Leu Glu Phe Ala His Val Phe Glu Ala Leu Gly Thr Lys Val Thr Ile 200 205

Leu Asn Arg Ser Asp Val Leu Leu Arg Glu Ala Asp Ala Asp Ile Ser

Ala Lys Ile Leu Glu Leu Ser Lys Lys Arg Phe Asp Val Arg Leu Ser 230 235

Thr Ala Val Thr Ala Val His Asn Lys Ala Asp Gly Gly Val Lys Ile

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275

285

280

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ggt Gly	gcc Ala	cac His	Pro) Leu	tac Tyr	aag Lys	gtg Val	ctc Leu 110	Lys	gag Glu	gca Ala	act Thr	gat Asp 115	ggt Gly	agc Ser	451
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cca																600
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cac cca tca co His Pro Ser Pi 215	cg ctg tcg gc co Leu Ser Al 22	a Ser Arg Gly Phe	ttt ggc tct aag cct 787 Phe Gly Ser Lys Pro 225
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Gly Val Phe Let 35	ı Ala Glu Glu	Glu Phe Leu Pro P	ro Val Asp Asp Val 45
Phe Arg Ala Phe 50	e Ser Tyr Pro 55	Phe Asp Ala Val L	ys Val Leu Ile Met 60
Gly Gln Asp Pro 65	Tyr Pro Thr	Pro Gly His Ala M	et Gly Leu Ser Phe 80
Ser Thr Gln Pro	Asp Val Arg 85	Pro Leu Pro Arg So	er Leu Asn Asn Ile 95
Phe Lys Glu Leu 100	Val Ser Asp	Val Gly Ser Leu G	ly Asp Ser Ala Ser 110
Glu Gln Gly Ala 115	Leu Asp Leu	Gly Ile Asn Ala Pr 120	o Gly Ser Val Ala 125
Gly Thr Gln Val	Ala Leu Pro 135	Ala Asp Gly Asp Le	eu Arg Ala Trp Ser
Asn Gln Gly Val 145	Ala Leu Phe 150	Asn Arg Val Leu Th 155	r Val His Pro Gly 160
Gln Ala Gly Ser	His Lys Gly 165	Lys Gly Trp Glu Al 170	a Val Thr Glu Gln 175

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1203

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Trp Glu Val Ala Arg Val His Ala Tyr Glu Thr Val Lys Asn Asn Val 50 55 60

Pro Val Pro Ser His Leu Thr Gly Pro Glu Asp Val Glu Leu Pro Ile 65 70 75 80

Leu Glu Met Glu Gln Pro Phe Trp Ser Thr Thr Leu Val Lys Glu Cys 85 90 95

Ala Pro Gly Glu Lys Asn Ala Ser Glu Lys Leu Phe Asp Phe Leu Glu 100 105 110

His Leu Gln Asp Tyr Pro Gln Ala Arg Asp Ser Leu Ala Arg Ser Ala 115 120 125

Thr Ser Lys Leu Ser Ala His Leu Arg Phe Gly Glu Ile Ser Ile His 130 135 140

Arg Val Trp Ala Glu Thr Ala Ala Ile Asp Ser Glu Gly Thr Glu Leu 145 150 155 160

Phe Leu Lys Glu Leu Leu Trp Arg Asp Phe Ala Trp His Arg Leu Tyr 165 170 175

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Phe Gly Trp Ser Trp Asp Pro Ser Glu Lys Asp Lys Leu Asn Thr Pro 195 200 205

Ser Thr Pro Leu Ile Pro Thr Lys Ala Asp Gln Phe His Glu Asp Leu 210 215 220

Ala Ala Trp Arg Ala Gly Lys Thr Gly Ile Pro Leu Val Asp Ala Gly 225 230 235 240

Met Arg Glu Leu Trp Ala Thr Gly Ser Met His Asn Arg Val Arg Met 245 250 255

Val Val Ala Ser Phe Leu Thr Lys Asn Leu Gln Ile His Trp Arg His 260 265 270

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Val Pro Val Pro Ser His Leu Thr Gly Pro Glu Asp Val Glu Leu Pro 50 55 60

Ile Leu Glu Met Glu Gln Pro Phe Trp Ser Thr Thr Leu Val Lys Glu 65 70 75 80

Cys Ala Pro Gly Glu Lys Asn Ala Ser Glu Lys Leu Phe Asp Phe Leu 85 90 95

Glu His Leu Gln Asp Tyr Pro Gln Ala Arg Asp Ser Leu Ala Arg Ser 100 105 110

Ala Thr Ser Lys Leu Ser Ala His Leu Arg Phe Gly Glu Ile Ser Ile 115 120 125

His Arg Val Trp Ala Glu Thr Ala Ala Ile Asp Ser Glu Gly Thr Glu 130 135 140

Leu Phe Leu Lys Glu Leu Leu Trp Arg Asp Phe Ala Trp His Arg Leu 145 150 155 160

Tyr Ala Leu Pro His Met Asp Thr Gln Asn Val Arg Met Gln Phe Asn 165 170 175

Arg Phe Gly Trp Ser Trp Asp Pro Ser Glu Lys Asp Lys Leu Asn Thr 180 185 190

Pro Ser Thr Pro Leu Ile Pro Thr Lys Ala Asp Gln Phe His Glu Asp 195 200 205

Leu Ala Ala Trp Arg Ala Gly Lys Thr Gly Ile Pro Leu Val Asp Ala 210 215 220

Gly Met Arg Glu Leu Trp Ala Thr Gly Ser Met His Asn Arg Val Arg 225 230 235 240

Met Val Val Ala Ser Phe Leu Thr Lys Asn Leu Gln Ile His Trp Arg 245 250 255

His Gly Glu Glu Trp Phe Trp Glu Thr Leu Val Asp Ala Asp Pro Ala 260 265 270

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40

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Phe Ala Asn Ala Ser Thr Asp Glu Ile Leu Arg Ser Trp Gly Lys Leu 65 70 75 80

Gly Tyr Pro Arg Arg Ala Leu Arg Leu Lys Glu Cys Ala Glu Val Ile 85 90 95

Val Glu Lys His Ala Gly Glu Val Pro Asp Thr Val Glu Ala Leu Leu 100 105 110

Ala Leu Pro Gly Ile Gly Asp Tyr Thr Ala Arg Ala Val Ala Ala Phe 115 120 125

His Phe Gly Gln Arg Val Pro Val Val Asp Thr Asn Val Arg Arg Val 130 135 140

Tyr Gln Arg Ala Val Ala Gly Arg Tyr Leu Ala Gly Pro Ala Lys Lys 145 150 155 160

Gln Glu Leu Ile Asp Val Ser Leu Leu Leu Pro Asn Thr His Ala Pro 165 170 175

Glu Phe Ser Ala Ala Ile Met Glu Leu Gly Ala Leu Ile Cys Thr Ala 180 185 190

Thr Ser Pro Lys Cys Asp Thr Cys Pro Leu Leu Asp Gln Cys Gln Trp 195 200 205

Gln Lys Leu Gly Cys Pro Ser Pro Ser Glu Glu Glu Leu Ala Ser Ala 210 215 220

Lys Lys Arg Val Gln Lys Phe Val Gly Thr Asp Arg Gln Val Arg Gly 225 235 240

Leu Ile Met Asp Val Leu Arg Asn Ala Thr Ala Pro Val Pro Leu Ser 245 250 255

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Leu Lys Met Glu Gly Thr Trp Ala Val His Arg Lys Gly Asp Arg Trp

Arg Lys Pro Gly His Thr Ala Arg Val Val Leu Val Leu Ser Glu Asn

Ile Glu Val Val Gly His Ser Leu Gly Phe Val Arg Val Phe Pro Ala

Asn Arg Tyr Ser Glu Glu Ile Ala Tyr Leu Gly Pro Asp Val Leu Ala

Glu Glu Phe Asp Ile Asn Thr Ala Arg Asn Asn Ile Ala Ser Asn Pro

Ser Arg Thr Ile Gly Glu Ala Leu Leu Asp Gln Ser Asn Leu Ala Gly

Val Gly Asn Glu Tyr Arg Ala Glu Ile Cys Phe Leu Met Gly Val His

Pro Ala Thr Gln Val Gly Tyr Val Asp Val Glu Lys Ala Leu Lys Ile

Thr Arg Arg Leu Met Trp Glu Asn Arg Asn Ser Pro Ile Arg Val Thr

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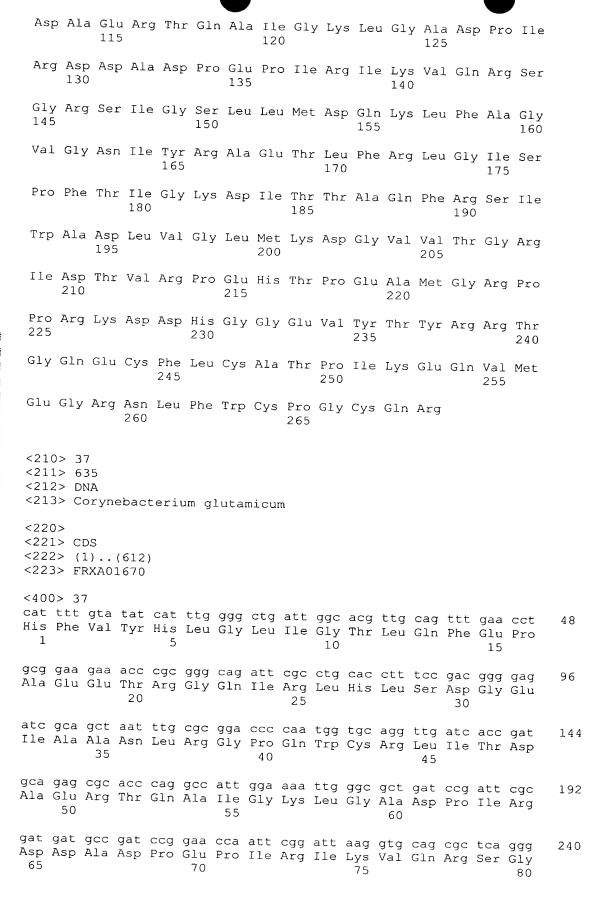
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Glu Ile Ala Ala Asn Leu Arg Gly Pro Gln Trp Cys Arg Leu Ile Thr

105

110

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90

403

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Ala Ala Arg Asn Gln Leu Gly Gly Gly Pro Glu Ile Glu Ala Asn Ile $35 \hspace{1cm} 40 \hspace{1cm} 45$

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Leu Leu Val His Leu Gly Met Ser Gly Gln Met Leu Ile Lys Glu Pro 85 90 95

Asp Ala Pro Ile Ser Pro His Leu Arg Ala Lys Val Glu Leu Asp Asn 100 105 110

Gly Asp Glu Val Trp Phe Val Asp Gln Arg Thr Phe Gly Tyr Trp Trp 115 120 125

Leu Gly Asp Leu Val Asp Gly Val Pro Glu Arg Val Ser His Ile Ala 130 135 140

Thr Asp Val Leu Asp Glu Ser Ala Asp Phe Ser Ala Ile Ala Arg Asn 145 150 155 160

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165 170 175

Ile Val Ser Gly Ile Gly Asn Ile Tyr Ala Asp Glu Met Leu Trp Gln
180 185 190

Ala Lys Ile His Pro Leu Gln Arg Ala Asp Arg Leu Ser Leu Ala Arg 195 200 205

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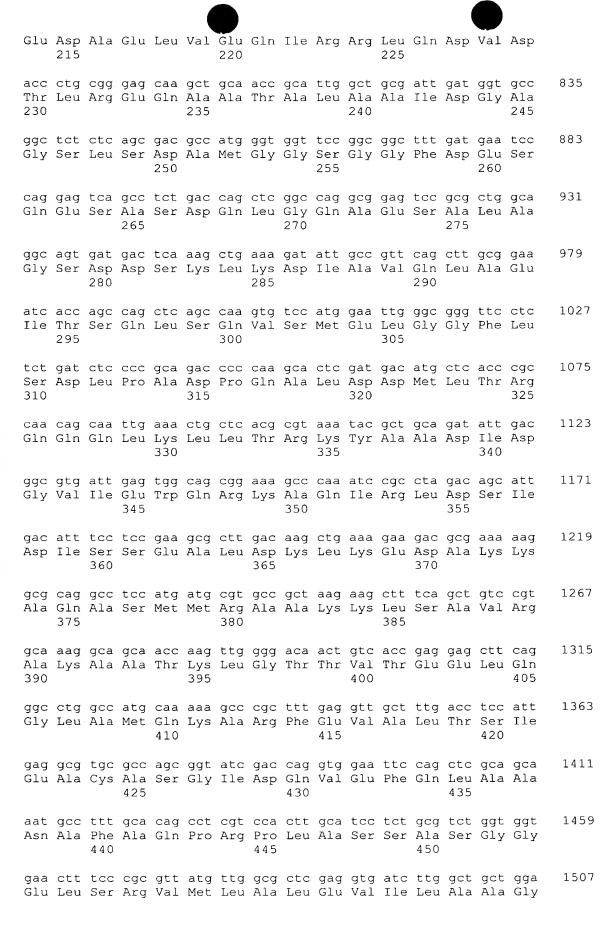
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	-	_	_			_			_		_	_	_			
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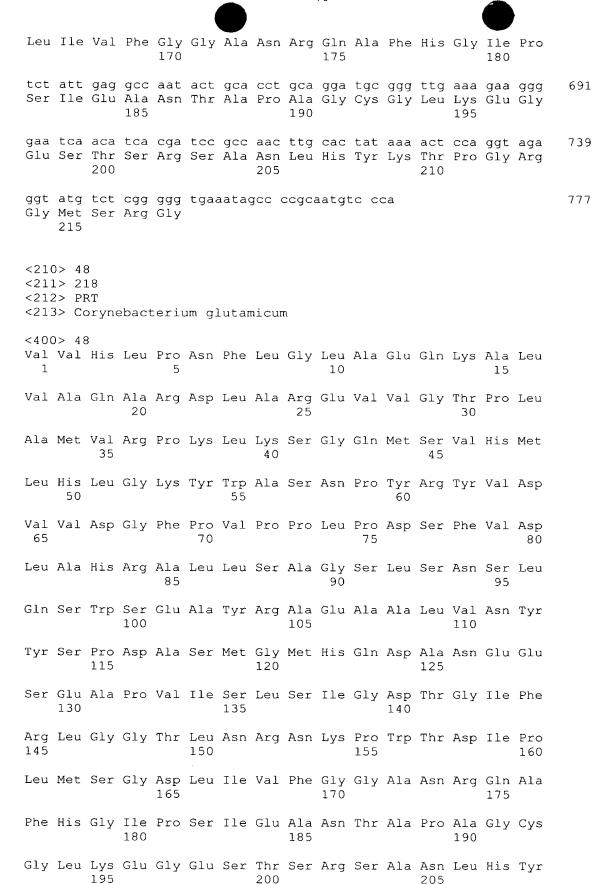
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643

691

739

777

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tct Ser	att : Ile	gaç Glu	g gcc Ala 185	Asn	act Thr	gca Ala	cct Pro	gca Ala 190	Gly	tgc Cys	Gly	ttg Leu	aaa Lys 195	gaa Glu	GJÀ āāā
gaa Glu	ı tca ı Ser	aca Thr 200	Ser	cga Arg	tcc Ser	gcc Ala	aac Asn 205	ttg Leu	cac His	tat Tyr	aaa Lys	act Thr 210	cca Pro	ggt Gly	aga Arg
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Leu	His 50	Leu	Gly	Lys	Tyr	Trp 55	Ala	Ser	Asn	Pro	Tyr 60	Arg	Tyr	Val	Asp
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Gly Phe Gly Lys Thr Asn Ile Val Glu Ala Ile Gly Tyr Leu Ala His $35 \hspace{1cm} 40 \hspace{1cm} 45$

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Gln Gly Leu Ser Gln Phe Ser Glu Phe Asp Ala Gly Ile Ile Glu Ala 245 250 255

Thr Leu Leu Thr Glu Leu Ala Ala Lys Arg Gln Arg Glu Ile Glu Arg 260 265 270

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Ph 30	e Ala	a Le	u Se	r Le	u Arc 310	g Il∈	e Ala	a Glu	ı Phe	a Ası 31	n Lei	ı Leı	ı Lys	s Sei	Asp 320	
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Ala Val His Asp 145	Asp Leu Pro 150	Glu Asn Leu	Lys Lys Val Leu 155	Thr Ala 160
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739

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Gly	Glu	Phe	Ser 100	Gly	Arg	Tyr	His	Val 105	Leu	Gly	Gly	Ala	Leu 110	Asp	Pro
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Ala	Thr	Asp	Pro	Asn 165	Thr	Glu	Gly	Glu	Ala 170	Thr	Ala	Ser	Tyr	Leu 175	Gly
Arg	Leu	Leu	Lys 180	Asp	Phe	Pro	Asp	Leu 185	Val	Ile	Ser	Arg	Leu 190	Ala	Ser
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120

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aaa

55 60 gca gtg gcg cag gtg ctg gtg tcc aac cct gcg gat cag acc agt ttg Ala Val Ala Gln Val Leu Val Ser Asn Pro Ala Asp Gln Thr Ser Leu 70 gaa gaa ttt gcg gag atc caa ggc gtt tcg gcg cgt act ttg cag cgc 288 Glu Glu Phe Ala Glu Ile Gln Gly Val Ser Ala Arg Thr Leu Gln Arg 8.5 cag ttc ctc aaa tcc acg ggc tat tca ttc agc gaa tgg cgt gcg 336 Gln Phe Leu Lys Ser Thr Gly Tyr Ser Phe Ser Glu Trp Arg Ala Ala 100 cag cgc gtc tgc gtc gcc gcg agc ctg ctg gcc cac gac ttc agc att 384 Gln Arg Val Cys Val Ala Ala Ser Leu Leu Ala His Asp Phe Ser Ile 115 tca gtg gtt gcg aac ctc gtc ggg ttc gcc gcg acc agc ttg acc 432 Ser Val Val Ala Asn Leu Val Gly Phe Ala Ala Thr Ser Ser Leu Thr 130 aga gct ttt cga cgc cac acc ggt gca act ccg tcc acc ttt act act 480 Arg Ala Phe Arg Arg His Thr Gly Ala Thr Pro Ser Thr Phe Thr Thr 150 gga cag atc ggc atg ggc tcc gca ggt cac cca cca cgc atc cca gca 528 Gly Gln Ile Gly Met Gly Ser Ala Gly His Pro Pro Arg Ile Pro Ala 165 acc acc acg ttt gcc gaa gcg cat cag gac cag cag ctg tgg att tac 576 Thr Thr Thr Phe Ala Glu Ala His Gln Asp Gln Gln Leu Trp Ile Tyr 180 age gga ace gea ace gte ace ece gge tae tge ega tte atg gga 624 Ser Gly Thr Ala Thr Val Thr Thr Pro Gly Tyr Cys Arg Phe Met Gly 195 200 caa ggt gac atg gtg acc atc cct gcc ggc acc caa acc cgc att gac 672 Gln Gly Asp Met Val Thr Ile Pro Ala Gly Thr Gln Thr Arg Ile Asp 210 215 gtg gca gcc gga tcc atc gca ttc cca gtc cca gtt gga ctc gac gaa 720 Val Ala Ala Gly Ser Ile Ala Phe Pro Val Pro Val Gly Leu Asp Glu 225 230 tgg gga atg gac cta acc cgc gtc gtg gct gtt aat aac cag cag cca 768 Trp Gly Met Asp Leu Thr Arg Val Val Ala Val Asn Asn Gln Gln Pro 245 aag cca ctg acc att ttg gaa cag tct gaa tgg tcc aag ctc agc gaa 816 Lys Pro Leu Thr Ile Leu Glu Gln Ser Glu Trp Ser Lys Leu Ser Glu 260 gaa ctt ctg aac act cct gta cct gta caa atg tgaaggtagt aaaggtgtga 869 Glu Leu Leu Asn Thr Pro Val Pro Val Gln Met 275

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Thr Asp Arg Val Pro Thr Pro Pro Leu Pro Ala Pro Arg Lys Ala Arg 50 55 60

Ala Val Ala Gln Val Leu Val Ser Asn Pro Ala Asp Gln Thr Ser Leu 65 70 75 80

Glu Glu Phe Ala Glu Ile Gln Gly Val Ser Ala Arg Thr Leu Gln Arg 85 90 95

Gln Phe Leu Lys Ser Thr Gly Tyr Ser Phe Ser Glu Trp Arg Ala Ala 100 105 110

Gln Arg Val Cys Val Ala Ala Ser Leu Leu Ala His Asp Phe Ser Ile 115 120 125

Ser Val Val Ala Asn Leu Val Gly Phe Ala Ala Thr Ser Ser Leu Thr 130 140

Arg Ala Phe Arg Arg His Thr Gly Ala Thr Pro Ser Thr Phe Thr Thr 145 150 155 160

Gly Gln Ile Gly Met Gly Ser Ala Gly His Pro Pro Arg Ile Pro Ala 165 170 175

Thr Thr Thr Phe Ala Glu Ala His Gln Asp Gln Gln Leu Trp Ile Tyr 180 185 190

Ser Gly Thr Ala Thr Val Thr Thr Pro Gly Tyr Cys Arg Phe Met Gly 195 200 205

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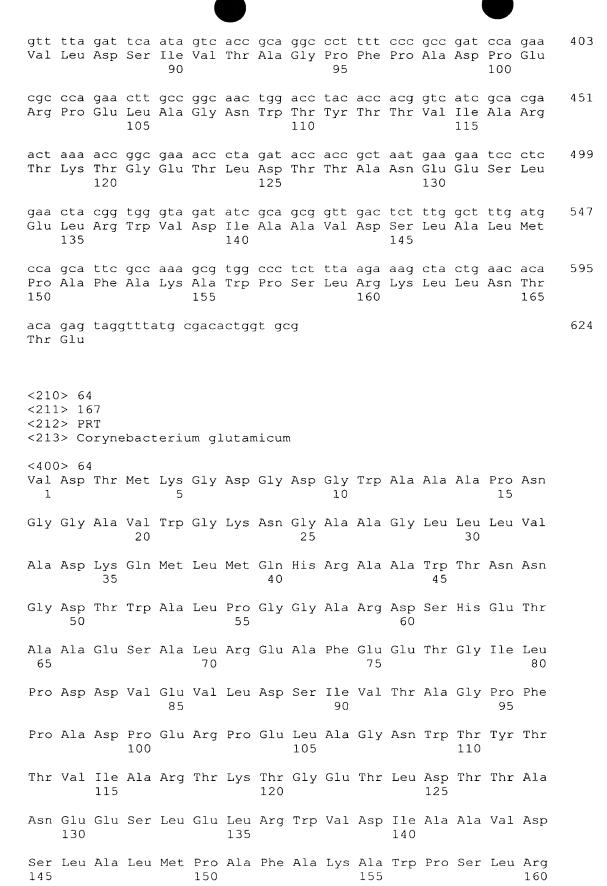
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                                             Val Lys Lys Arg Ile
aat gta acc ggc gcc gtc cta gtc aag gaa aac cgt atc ctt gca gca
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Asn Val Thr Gly Ala Val Leu Val Lys Glu Asn Arg Ile Leu Ala Ala
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caa cgt ggt cca gag atg tca ctt ccc gga tat tgg gag ttt ccg gga
                                                                    211
Gln Arg Gly Pro Glu Met Ser Leu Pro Gly Tyr Trp Glu Phe Pro Gly
gga aag atc gag cag ggc gaa act cca gaa gct tca ctt gca cga gag
                                                                   259
Gly Lys Ile Glu Gln Gly Glu Thr Pro Glu Ala Ser Leu Ala Arg Glu
ctc aaa gaa gaa ttg ctt tgc gac gcc acc gta ggc gaa cac ctc acc
                                                                   307
Leu Lys Glu Glu Leu Leu Cys Asp Ala Thr Val Gly Glu His Leu Thr
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act aca gag cac gag tac gac ttt gga atc gtc gtg ctt tcc acc tac
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Thr Thr Glu His Glu Tyr Asp Phe Gly Ile Val Val Leu Ser Thr Tyr
tto tgc aca cta aat gat gca gag cct caa ttg acc gag cat gct gag
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Phe Cys Thr Leu Asn Asp Ala Glu Pro Gln Leu Thr Glu His Ala Glu
atc cgc tgg gtg gca cca cac gaa ttg gaa tct ttg gag tgg gca cct
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Ile Arg Trp Val Ala Pro His Glu Leu Glu Ser Leu Glu Trp Ala Pro
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                                 110
gct gat att cct gcg gtg aaa ctt ctc gtc gag cag ctt gct
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Lys Leu Leu Asn Thr Thr Glu 165

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ttc cat gtg gtt ccg gat gtg ttg ttg gtc aag cgc gct gat act ggt 259 Phe His Val Val Pro Asp Val Leu Leu Val Lys Arg Ala Asp Thr Gly 40 45 50
gag tgg act cca ccg acc ggt att tgt gat ccg gat gag cag cct cat 307 Glu Trp Thr Pro Pro Thr Gly Ile Cys Asp Pro Asp Glu Gln Pro His 55 60 65
gtg act gcg gtg cgt gaa gtc aag gag gaa acc ggc ctt gat gtc agc 355 Val Thr Ala Val Arg Glu Val Lys Glu Glu Thr Gly Leu Asp Val Ser 70 75 80 85
gtt gag gcg ttg ctt ggc gtg ggc gcg gtg ggg cct gtg acc tat caa 403 Val Glu Ala Leu Leu Gly Val Gly Ala Val Gly Pro Val Thr Tyr Gln 90 95 100
aat ggt gat gtg gcg agc tac atg gat acg acc atg cgt tgc gtt gtt 451 Asn Gly Asp Val Ala Ser Tyr Met Asp Thr Thr Met Arg Cys Val Val 105 110 115
tct ggt gat tcc gat gag cct cac gtc ggc gat gac gag aac gtg gat 499 Ser Gly Asp Ser Asp Glu Pro His Val Gly Asp Asp Glu Asn Val Asp 120 125 130
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cgc atg gtc atc gct gat gcg gtg gca cag ttg aag cat ccg caa ggt 595 Arg Met Val Ile Ala Asp Ala Val Ala Gln Leu Lys His Pro Gln Gly 150 165

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Pro Pro Gly Ser Pro Phe His Val Val Pro Asp Val Leu Leu Val Lys

Arg Ala Asp Thr Gly Glu Trp Thr Pro Pro Thr Gly Ile Cys Asp Pro 50 55 60

Asp Glu Gln Pro His Val Thr Ala Val Arg Glu Val Lys Glu Glu Thr 65 70 75 80

Gly Leu Asp Val Ser Val Glu Ala Leu Leu Gly Val Gly Ala Val Gly 85 90 95

Pro Val Thr Tyr Gln Asn Gly Asp Val Ala Ser Tyr Met Asp Thr Thr 100 105 110

Met Arg Cys Val Val Ser Gly Asp Ser Asp Glu Pro His Val Gly Asp 115 120 120

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Val Asp Leu Asn Ala ctt ttt gag atc ttg acg ttg gta gtt ttc caa gtg ggt gtc acc tgg 163 Leu Phe Glu Ile Leu Thr Leu Val Val Phe Gln Val Gly Val Thr Trp 1.0 cat gct gtg ctg tcc aaa cgg gaa ggg ttc cgt caa gca ttc gcc caa 211 His Ala Val Leu Ser Lys Arg Glu Gly Phe Arg Gln Ala Phe Ala Gln ttc gat gtt gca aaa gta gcc gcc ttc aat gag gac gac gtg gaa cgc 259 Phe Asp Val Ala Lys Val Ala Ala Phe Asn Glu Asp Asp Val Glu Arg cta ctt gat gat cta cag att ttt aga aac cga aga aaa atc aac gct 307 Leu Leu Asp Asp Leu Gln Ile Phe Arg Asn Arg Arg Lys Ile Asn Ala gcc atc acc aat gcc aaa gcg ttg ctg gag tta aac gat gaa aca ggc 355 Ala Ile Thr Asn Ala Lys Ala Leu Leu Glu Leu Asn Asp Glu Thr Gly acc ttt gac tca att att gcc gac cac tca act gac gcc aca gcc atg 403 Thr Phe Asp Ser Ile Ile Ala Asp His Ser Thr Asp Ala Thr Ala Met 90 gtg aag cat ctc aaa gcc ttg ggc ttt acc cat atc gga ctg acc tcc 451 Val Lys His Leu Lys Ala Leu Gly Phe Thr His Ile Gly Leu Thr Ser 105 110 ttg agc atc ctc cag cag gcc att ggg gtc aca gag ctg aag gct gcc 499 Leu Ser Ile Leu Gln Gln Ala Ile Gly Val Thr Glu Leu Lys Ala Ala 125 130 taagatataa ctccgatgac aac 522 <210> 70 <211> 133 <212> PRT <213> Corynebacterium glutamicum <400> 70 Val Asp Leu Asn Ala Leu Phe Glu Ile Leu Thr Leu Val Val Phe Gln Val Gly Val Thr Trp His Ala Val Leu Ser Lys Arg Glu Gly Phe Arg Gln Ala Phe Ala Gln Phe Asp Val Ala Lys Val Ala Ala Phe Asn Glu Asp Asp Val Glu Arg Leu Leu Asp Asp Leu Gln Ile Phe Arg Asn Arg 55 Arg Lys Ile Asn Ala Ala Ile Thr Asn Ala Lys Ala Leu Leu Glu Leu Asn Asp Glu Thr Gly Thr Phe Asp Ser Ile Ile Ala Asp His Ser Thr 85 90

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Ile Leu Ala Thr Ile Asn Asn Ala Lys Ala Thr Leu Gln Leu Arg Glu 115

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Lys Gly Gly Leu Val Glu Phe Val Trp Gly Phe Lys Pro Ile Asp Thr 125

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cat His	ttg Leu	gtg Val	ggc Gly 185	agc Ser	cat His	cgc Arg	cgc Arg	gga Gly 190	agt Ser	tct Ser	ggg Gly	gtg Val	tgg Trp 195	gct Ala		688
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Ala Phe Gln Ser Gly Leu Ser Trp Ala Thr Ile Leu Arg Lys Arg Asp 50 55 60

Ser Phe Arg Ala Ala Phe Ser Gln Phe Asp Pro Glu Leu Val Ala Lys 65 70 75 80

Phe Thr Asp Ala Asp Ile Glu Arg Leu Met Glu Asp Ala Gly Ile Val 85 90 95

Arg Asn Lys Arg Lys Ile Leu Ala Thr Ile Asn Asn Ala Lys Ala Thr 100 105 110

Leu Gln Leu Arg Glu Lys Gly Gly Leu Val Glu Phe Val Trp Gly Phe 115 120 125

Lys Pro Ile Asp Thr Pro Gln Pro Glu Thr Leu Glu Glu Ile Pro Thr 130 135 140

Gln Ser Pro Glu Ser Val Ala Leu Ser Lys Ala Leu Lys Lys Glu Gly

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Leu Asp Gln Leu Glu Arg Arg Leu Ser Glu Leu Glu Arg Glu Ile Ala
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gcg att cgt cag gag atc cgc cag gaa cgc cta gtg ctt ccg gaa ccg
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Ala Ile Arg Gln Glu Ile Arg Gln Glu Arg Leu Val Leu Pro Glu Pro
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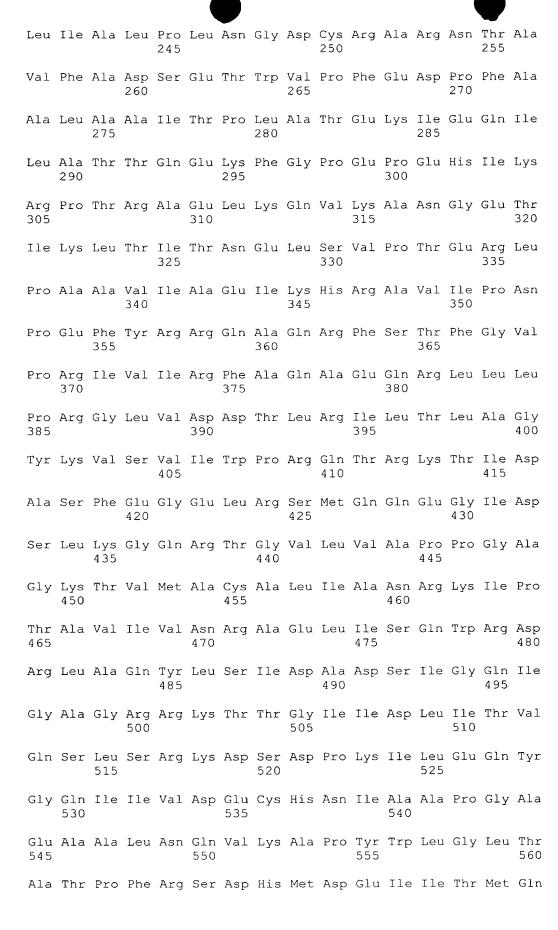
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215

230

Gln Asp Thr Ile Ala Thr Arg Ala Asn Gly Ser Ala Arg Leu Gly Asn

BGI-127CP - 100 -



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Leu Glu Lys Asp Leu Glu Arg Leu Arg Lys Asn Gly Lys Asp Asp Glu

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					gat Asp 315											1075
					aag Lys											1123
tta Leu	ccc Pro	aat Asn	ggt Gly 345	aaa Lys	cgc Arg	cca Pro	gag Glu	tca Ser 350	ata Ile	ctg Leu	gac Asp	gga Gly	tac Tyr 355	tct Ser	gaa Glu	1171
					ctt Leu											1219
cat His	gaa Glu 375	gta Val	caa Gln	gga Gly	gta Val	ctt Leu 380	gct Ala	gaa Glu	agc Ser	aac Asn	ggt Gly 385	act Thr	ggc Gly	gtt Val	ccc Pro	1267
cga Arg 390	atg Met	ttc Phe	aat Asn	ttg Leu	atg Met 395	cgt Arg	gaa Glu	gcg Ala	gga Gly	ctt Leu 400	ccg Pro	gta Val	ccg Pro	aat Asn	ttt Phe 405	1315
					agc Ser											1363
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gcg Ala	gta Val 455	acg Thr	tct Ser	cga Arg	gat Asp	ctc Leu 460	cgc Arg	aat Asn	caa Gln	act Thr	ggt Gly 465	cat His	gat Asp	tca Ser	gaa Glu	1507
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caa Gln	aac Asn	tta Leu	cag Gln	aac Asn 490	caa Gln	tat Tyr	cag Gln	ctt Leu	gcg Ala 495	aca Thr	tcg Ser	tct Ser	gtg Val	aat Asn 500	gta Val	1603

act Thr	caa Gln	agc Ser	gaa Glu 505	caa Gln	gaa Glu	gtc Val	tta Leu	gat Asp 510	Ala	atc Ile	aat Asn	aaa Lys	aca Thr 515	act Thr	cct Pro	1651
gtc Val	aca Thr	att Ile 520	Arg	gaa Glu	att Ile	gcc Ala	aca Thr 525	aaa Lys	aca Thr	G] À aaa	aaa Lys	act Thr 530	gca Ala	tcg Ser	tct Ser	1699
ctt Leu	cgg Arg 535	ccg Pro	ctg Leu	ctt Leu	cgt Arg	ggc Gly 540	ctt Leu	gtt Val	gaa Glu	gca Ala	ggt Gly 545	ctt Leu	gtg Val	gtt Val	gca Ala	1747
act Thr 550	gct Ala	cca Pro	cca Pro	tca Ser	agc Ser 555	cgc Arg	aac Asn	cga Arg	gcg Ala	tac Tyr 560	ttg Leu	aag Lys	gct Ala			1789
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1				5					10					15		
Gly	Lys	Asp	Asp 20	Glu	Thr	Val	Glu	Val 25	Lys	Ser	Trp	Gly	Arg 30	Leu	Pro	
Leu	Ser	Lys 35	Gly	Ser	Lys	Ser	Phe 40	Trp	Glu	Ser	Leu	Ser 45	Ala	Phe	Ala	
Asn	Thr 50	Asn	Gly	Gly	Tyr	Ile 55	Leu	Leu	Gly	Leu	Ser 60	Glu	Pro	Asp	Phe	
Thr 65	Pro	Val	Glu	Gly	Phe 70	Asp	Ser	Gln	Ala	Ser 75	Ile	Gln	Phe	Ile	Arg 80	
Ala	Gly	Leu	Asn	Pro 85	Gln	Asp		Asp			Lys	Val	Glu	Pro 95	Val	
Pro	His	His	Glu 100	Ile	His	Glu	Met	Thr 105	Val	Asp	Gly	Ala	Glu 110	Val	Val	
Leu	Val	Ser 115	Val	Ser	Pro	Leu	Ser 120	Val	Asn	Gly	Pro	Cys 125	Tyr	Tyr	Leu	
Pro	Val 130	Gly	Ile	Thr	Asn	Gly 135	Ser	Phe	Lys	Arg	Val 140	Gly	Asp	Glu	Asp	
Arg 145	Lys	Leu	Ser	His	Leu 150	Glu	Ile	Tyr	Glu	Leu 155	Gln	Asn	Arg	Phe	Val 160	
Gln	Thr	Lys	Thr	Asp 165	Arg	Asn	Pro	Val	Pro 170	Asp	Ser	Ser	Ile	Asp 175	Asp	
Leu	Asn	Asn	Gln 180	Leu	Ala	Ala	Ser	Phe 185	Lys	Gln	Arg	Leu	Ile 190	Glu	Ser	

Asn Ser Arg Ser Leu Gly Thr Asp Asp Asn Trp Leu Leu Arg Lys Asn 200 Ile Thr Thr Ser Lys Gly Glu Leu Thr Ile Ala Gly Leu Leu Ala Leu Gly Ser Tyr Pro Gln Gln Phe Phe Pro Arg Val Ile Ile Asp Val Ala 235 Val His Pro Gly Leu His Lys Ser Pro Ile Gly Thr Ser Ile Arg Phe 250 Glu Asp Arg Lys Ile Cys Glu Gly Asn Leu Leu Glu Met Val Gln Glu 265 Ala Met Ser Ala Ile Lys Arg Asn Leu Arg Val Arg Val Val Glu 280 Gly Leu Ser Gly Lys Asp Val Leu Glu Ile Pro Glu Glu Val Leu Arg 295 Glu Ala Leu Ala Asn Ala Val Leu His Arg Asp Tyr Ser Glu Leu Ala 315 Gln Asn Glu Ala Ile His Val Asp Ile Tyr Lys Asp Arg Val Glu Ile 330 Thr Ser Pro Gly Gly Leu Pro Asn Gly Lys Arg Pro Glu Ser Ile Leu 345 Asp Gly Tyr Ser Glu Pro Arg Asn Arg Val Leu Ser Arg Ile Leu Met Asp Ile Pro Trp Thr His Glu Val Gln Gly Val Leu Ala Glu Ser Asn Gly Thr Gly Val Pro Arg Met Phe Asn Leu Met Arg Glu Ala Gly Leu 395 Pro Val Pro Asn Phe Lys Ile Asp Ile Ser Ser Val Thr Val Glu Leu Ser Arg His Gly Leu Leu Asp Ala Gln Thr Ser Glu Trp Leu Val Glu Lys Leu Gly Ser Asp Phe Ser Asn Thr Gln Gly Ile Ala Leu Val Leu Ala Lys Glu Leu Gly Ala Val Thr Ser Arg Asp Leu Arg Asn Gln Thr 460 Gly His Asp Ser Glu Asp Met Arg Ser Leu Leu Asp Ala Leu Val Asp Arg Gly Val Leu Asn Gln Asn Leu Gln Asn Gln Tyr Gln Leu Ala Thr 490 Ser Ser Val Asn Val Thr Gln Ser Glu Gln Glu Val Leu Asp Ala Ile 505 Asn Lys Thr Thr Pro Val Thr Ile Arg Glu Ile Ala Thr Lys Thr Gly

515 520 525 Lys Thr Ala Ser Ser Leu Arg Pro Leu Leu Arg Gly Leu Val Glu Ala 535 Gly Leu Val Val Ala Thr Ala Pro Pro Ser Ser Arg Asn Arg Ala Tyr 545 550 Leu Lys Ala

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aga aca gag ttt gaa att ccg gga gga att cca cct cgt cga aac ggt 163 Arg Thr Glu Phe Glu Ile Pro Gly Gly Ile Pro Pro Arg Arg Asn Gly 10

ggt caa ggc cgt gca gct gat acc aac gta gat gcg aac ctg aag cct 211 Gly Gln Gly Arg Ala Ala Asp Thr Asn Val Asp Ala Asn Leu Lys Pro

gat gaa tac gat gcg gaa gta aca ctt cgt ccg aag tct ttg act gag 259 Asp Glu Tyr Asp Ala Glu Val Thr Leu Arg Pro Lys Ser Leu Thr Glu

ttt atc ggc cag ccg aag gtg cgc gat cag ctt agt ttg gtg ctt acc 307 Phe Ile Gly Gln Pro Lys Val Arg Asp Gln Leu Ser Leu Val Leu Thr 60

ggt gcg aaa aac cgt ggt gtg gtt ccc gat cac gtg ttg tct ggc 355 Gly Ala Lys Asn Arg Gly Val Val Pro Asp His Val Leu Leu Ser Gly

cct cct ggc ctg ggt aag acc acc atg gcg atg att atc gcc cag gag 403 Pro Pro Gly Leu Gly Lys Thr Thr Met Ala Met Ile Ile Ala Gln Glu 90

ttg ggc acc agt ttg cgt atg acc tca ggc cca gcc ttg gaa cgc gca 451 Leu Gly Thr Ser Leu Arg Met Thr Ser Gly Pro Ala Leu Glu Arg Ala 105 110 115

ggc gat ctg gct gcc atg ctg tcc aac ctc atg gaa ggg gac gtg ctg 499 Gly Asp Leu Ala Ala Met Leu Ser Asn Leu Met Glu Gly Asp Val Leu 120 125

ttt Phe	atte Ile 135	e Asp	gaç Glu	g att 1 Ile	cac His	c cgc Arg	Il∈	gca Ala	cgt Arg	cet p Pro	gcc Ala 145	Glu	gaa Glu	atg Met	ctg Leu	547
tac Tyr 150	Met	g gcg : Ala	ı atçı Met	gaa : Glu	gat Asp 155	Phe	cgg Arg	atc Ile	gat Asp	gtc Val 160	Ile	gtc Val	ggt Gly	aag Lys	ggt Gly 165	595
cct Pro	Gly	gct Ala	acc Thr	tca Ser 170	atc Ile	ccg Pro	ctg Leu	gag Glu	atc Ile 175	Pro	ccc Pro	ttt Phe	acc Thr	ctc Leu 180	gtt Val	643
ggt Gly	gca Ala	acc Thr	acc Thr 185	Arg	tcg Ser	ggc Gly	atg Met	ctc Leu 190	acc Thr	ggc Gly	cca Pro	ctg Leu	cgt Arg 195	gac Asp	cgt Arg	691
ttc Phe	ggt Gly	ttt Phe 200	acc Thr	gcg Ala	cag Gln	atg Met	gaa Glu 205	ttc Phe	tac Tyr	gat Asp	gtg Val	cct Pro 210	gat Asp	ctg Leu	acc Thr	739
aaa Lys	gtg Val 215	gtg Val	aaa Lys	cga Arg	aca Thr	gct Ala 220	aag Lys	atc Ile	ctc Leu	gat Asp	gtc Val 225	gga Gly	atc Ile	gac Asp	aac Asn	787
gat Asp 230	gcc Ala	gcc Ala	gtg Val	gaa Glu	att Ile 235	gcc Ala	tcg Ser	cgg Arg	tct Ser	cgt Arg 240	ggt Gly	act Thr	cct Pro	cgt Arg	att Ile 245	835
gct Ala	aac Asn	cga Arg	ctg Leu	ctt Leu 250	cgt Arg	cga Arg	gtc Val	cgt Arg	gac Asp 255	ttc Phe	gct Ala	gaa Glu	gtt Val	cat His 260	gcg Ala	883
gat Asp	ggt Gly	cac His	atc Ile 265	acg Thr	atg Met	ggt Gly	gct Ala	gcc Ala 270	aat Asn	gct Ala	gcg Ala	ctg Leu	att Ile 275	gta Val	ttc Phe	931
gat Asp	gtc Val	gat Asp 280	gaa Glu	gtc Val	gga Gly	ctc Leu	gat Asp 285	cgc Arg	ctg Leu	gat Asp	agg Arg	gca Ala 290	gtg Val	ctt Leu	gat Asp	979
gcc Ala	ttg Leu 295	atc Ile	cgc Arg	gga Gly	cat His	ggc Gly 300	gga Gly	ggc Gly	cct Pro	gtt Val	ggc Gly 305	gtg Val	aac Asn	aca Thr	ctc Leu	1027
gcg Ala 310	gtt Val	gca Ala	gtt Val	ggt Gly	gaa Glu 315	gaa Glu	ccc Pro	ggc Gly	act Thr	gtg Val 320	gaa Glu	gaa Glu	gta Val	tgc Cys	gag Glu 325	1075
ccc Pro	tat Tyr	ttg Leu	gtg Val	cgt Arg 330	gcc Ala	ggc Gly	atg Met	att Ile	gca Ala 335	cga Arg	acc Thr	gga Gly	cgg Arg	gga Gly 340	cgc Arg	1123
gtg Val	gca Ala	acc Thr	gca Ala 345	gct Ala	gca Ala	tgg Trp	aga Arg	cac His 350	ctg Leu	ggg Gly	ctg Leu	gaa Glu	cca Pro 355	cca Pro	gaa Glu	1171
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<212> PRT

<213> Corynebacterium glutamicum

<400> 80

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Ala Asn Leu Lys Pro Asp Glu Tyr Asp Ala Glu Val Thr Leu Arg Pro
35 40 45

Lys Ser Leu Thr Glu Phe Ile Gly Gln Pro Lys Val Arg Asp Gln Leu 50 60

Ser Leu Val Leu Thr Gly Ala Lys Asn Arg Gly Val Val Pro Asp His 65 70 75 80

Val Leu Leu Ser Gly Pro Pro Gly Leu Gly Lys Thr Thr Met Ala Met
85 90 95

Ile Ile Ala Gln Glu Leu Gly Thr Ser Leu Arg Met Thr Ser Gly Pro
100 105 110

Ala Leu Glu Arg Ala Gly Asp Leu Ala Ala Met Leu Ser Asn Leu Met 115 120 125

Glu Gly Asp Val Leu Phe Ile Asp Glu Ile His Arg Ile Ala Arg Pro 130 135 140

Ala Glu Glu Met Leu Tyr Met Ala Met Glu Asp Phe Arg Ile Asp Val 145 150 155 160

Ile Val Gly Lys Gly Pro Gly Ala Thr Ser Ile Pro Leu Glu Ile Pro 165 170 175

Pro Phe Thr Leu Val Gly Ala Thr Thr Arg Ser Gly Met Leu Thr Gly 180 185 190

Pro Leu Arg Asp Arg Phe Gly Phe Thr Ala Gln Met Glu Phe Tyr Asp 195 200 205

Val Pro Asp Leu Thr Lys Val Val Lys Arg Thr Ala Lys Ile Leu Asp 210 215 220

Val Gly Ile Asp Asn Asp Ala Ala Val Glu Ile Ala Ser Arg Ser Arg 225 230 235 240

Gly Thr Pro Arg Ile Ala Asn Arg Leu Leu Arg Arg Val Arg Asp Phe 245 250 255

Ala Glu Val His Ala Asp Gly His Ile Thr Met Gly Ala Ala Asn Ala 260 265 270

Ala Leu Ile Val Phe Asp Val Asp Glu Val Gly Leu Asp Arg Leu Asp 275 280 285

Arg Ala Val Leu Asp Ala Leu Ile Arg Gly His Gly Gly Pro Val

290 295 300

Gly Val Asn Thr Leu Ala Val Ala Val Gly Glu Glu Pro Gly Thr Val 305 310 315 320

Glu Glu Val Cys Glu Pro Tyr Leu Val Arg Ala Gly Met Ile Ala Arg 325 330 335

Thr Gly Arg Gly Arg Val Ala Thr Ala Ala Trp Arg His Leu Gly 340 345 350

Leu Glu Pro Pro Glu Gly Thr Ile Gly Asp Tyr 355 360

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<211> 741

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<220>

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<223> RXA00928

<400> 81

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cgt ggc act gtt atc aac att ggt ctg agc tct gct gtc att gaa tgc 163 Arg Gly Thr Val Ile Asn Ile Gly Leu Ser Ser Ala Val Ile Glu Cys 10 15 20

aat ggc gtg ggc tat gag gtt gtc acc aca ccg aac acc ttg tca cag 211 Asn Gly Val Gly Tyr Glu Val Val Thr Thr Pro Asn Thr Leu Ser Gln 25 30

ttg gtc cgc ggt gag gaa gca ctg gtg ttg acc acc atg gtg gtc cgc 259 Leu Val Arg Gly Glu Glu Ala Leu Val Leu Thr Thr Met Val Val Arg

gaa gac gcg atg aaa ctc tat ggg ttt att gac aat gaa tca cgt gag 307 Glu Asp Ala Met Lys Leu Tyr Gly Phe Ile Asp Asn Glu Ser Arg Glu

atg ttt tcc gtg ttg caa aca gta tct gga ttg ggt cca cgc ctg gcc $\,$ 355 Met Phe Ser Val Leu Gln Thr Val Ser Gly Leu Gly Pro Arg Leu Ala $\,$ 70 $\,$ 80 $\,$ 85

ttg gca tgt gaa tcg gtg ttg agc cca ctg gag att tct cag gcg atc
Leu Ala Cys Glu Ser Val Leu Ser Pro Leu Glu Ile Ser Gln Ala Ile
90 95 100

acc aat gcc gat gcc aaa act ttg cag cgg gtt ccg ggt gtg gga aag 451
Thr Asn Ala Asp Ala Lys Thr Leu Gln Arg Val Pro Gly Val Gly Lys
105 110 115

cgc atg gca gat cgt ctc atc gtg gag ctt aaa ggc aag gtc gca gct 499

### Ala Asp Arg Leu Ile Val Glu Leu Lys Gly Lys Val Ala Ala 120						,										•	
Phe Ala Ala Gly Val Val Asp Glu Gly Gly Glu Gln Tle Ser Leu Pro 135 140 aac gcg aac att gct tct gag gtg gtt gtg gag cag gtt tct caa gcg Asn Ala Asn Ile Ala Ser Glu Val Val Val Glu Gln Val Ser Gln Ala 150 ctg gtg gtg gtg ttg ggc ttt agc gag aag caa tca gat gca gtg agc Lou Val Gly Leu Gly Phe Ser Glu Lys Gln Ser Asp Asp Ala Val Ser 170 ttt gtg ctg gcg gcg gat cca tcc ttg gac acc agt ggc gcg ctt cgt Phe Val Leu Ala Ala Asp Pro Ser Leu Asp Thr Ser Gly Ala Leu Arg 185 gcc gca ttg gca aaa ctc agc gga aag tagaccctca tgtccgatgt Ala Ala Leu Ala Lys Leu Ser Gly Lys 200 gga 741	Arg	Met	Ala 120	Asp	Arg	Leu	Ile		Glu	Leu	Lys	Gly			Ala	Ala	
Ash Ala Ash Ile Ala Ser Glu Val Val Val Clu Clu Val Ser Gln Ala 150 165 165 165 165 165 165 165 165 165 165	ttt Phe	Ala	Ala	ggt Gly	gtc Val	gtg Val	Asp	Glu	gga Gly	Gly	gag Glu	Gln	Ile	tcc Ser	ttg Leu	cct Pro	547
Leu Val Gly Leu Gly Phe Ser Glu Lys Gln Ser Asp Asp Ala Val Ser 170 ttt gtg ctg gcg gcg gat cca tce ttg gac acc agt ggc gct ccgt Phe Val Leu Ala Ala Asp Pro Ser Leu Asp Thr Ser Gly Ala Leu Arg 195 gcc gca ttg gca aaa ctc agc gga aag tagaccctca tgtccgatgt Ala Ala Leu Ala Lys Leu Ser Gly Lys 200 gga 741 <pre> </pre> <pre></pre>	Asn	Ala	aac Asn	att Ile	gct Ala	Ser	gag Glu	gtg Val	gtt Val	gtg Val	Glu	Gln	gtt Val	tct Ser	caa Gln	Ala	595
gcc gca ttg gca aaa ctc agc gga aag tagaccctca tgtccgatgt Ala Ala Leu Ala Lys Leu Ser Gly Lys 200 gga 741 <pre></pre>	ctg Leu	gtg Val	Gly	ttg Leu	Gly	ttt Phe	agc Ser	gag Glu	aag Lys	Gln	tca Ser	gat Asp	gat Asp	gca Ala	Val	agc Ser	643
gga 741	ttt Phe	gtg Val	ctg Leu	Ala	gcg Ala	gat Asp	cca Pro	tcc Ser	Leu	gac Asp	acc Thr	agt Ser	ggc Gly	Ala	ctt Leu	cgt Arg	691
<pre> </pre> <pre> <210> 82 <211> 206 <212> PRT </pre> <pre> <213> Corynebacterium glutamicum </pre> <pre> <400> 82 Met Ile Ala Ser Leu Arg Gly Thr Val Ile Asn Ile Gly Leu Ser Ser 1</pre>	gcc Ala	gca Ala	Leu	gca Ala	aaa Lys	ctc Leu	agc Ser	Gly	aag Lys	taga	accci	tca 1	tgtc	cgat	gt		738
<pre><211> 206 <212> PRT </pre> <pre><213> Corynebacterium glutamicum </pre> <pre><400> 82 Met Ile Ala Ser Leu Arg Gly Thr Val Ile Asn Ile Gly Leu Ser Ser</pre>	gga																741
Met Ile Ala Ser Leu Arg Gly Thr Val Ile Asn Ile Gly Leu Ser Ser 15 Ala Val Ile Glu Cys Asn Gly Val Gly Tyr Glu Val Val Thr Thr Pro 20 Asn Thr Leu Ser Gln Leu Val Arg Gly Glu Glu Ala Leu Val Leu Thr 45 Thr Met Val Val Arg Glu Asp Ala Met Lys Leu Tyr Gly Phe Ile Asp 60 Asn Glu Ser Arg Glu Met Phe Ser Val Leu Gln Thr Val Ser Gly Leu 80 Gly Pro Arg Leu Ala Leu Ala Cys Glu Ser Val Leu Ser Pro Leu Glu 95 Ile Ser Gln Ala Ile Thr Asn Ala Asp Ala Lys Thr Leu Gln Arg Val 100 Pro Gly Val Gly Lys Arg Met Ala Asp Arg Leu Ile Val Glu Glu Leu Lys 125 Gly Lys Val Ala Ala Phe Ala Ala Gly Val Val Asp Glu Gly Gly Glu Glu Ile Ser Leu Pro Asn Ala Asn Ile Ala Ser Glu Val Val Val Glu	<213 <212	1> 20 2> PF)6 ?T	ebact	teri	ım gl	utam	nicum	ı								
Asn Thr Leu Ser Gln Leu Val Arg Gly Glu Glu Ala Leu Val Leu Thr 45 Thr Met Val Val Arg Glu Asp Ala Met Lys Leu Tyr Gly Phe Ile Asp 50 Asn Glu Ser Arg Glu Met Phe Ser Val Leu Gln Thr Val Ser Gly Leu 75 Gly Pro Arg Leu Ala Leu Ala Cys Glu Ser Val Leu Ser Pro Leu Glu 95 Ile Ser Gln Ala Ile Thr Asn Ala Asp Ala Lys Thr Leu Gln Arg Val 105 Pro Gly Val Gly Lys Arg Met Ala Asp Arg Leu Ile Val Glu Glu Leu Lys 125 Gly Lys Val Ala Ala Phe Ala Ala Gly Val Val Asp Glu Gly Gly Glu Gln Ile Ser Leu Pro Asn Ala Asn Ile Ala Ser Glu Val Val Val Glu	Met			Ser		Arg	Gly	Thr	Val		Asn	Ile	Gly	Leu		Ser	
Thr Met Val Val Arg Glu Asp Ala Met Lys Leu Tyr Gly Phe Ile Asp 550 Val Val Ser Arg Glu Met Phe Ser Val Leu Gln Thr Val Ser Gly Leu 800 Gly Pro Arg Leu Ala Leu Ala Cys Glu Ser Val Leu Ser Pro Leu Glu 95 Ile Ser Gln Ala Ile Thr Asn Ala Asp Ala Lys Thr Leu Gln Arg Val 100 Pro Gly Val Gly Lys Arg Met Ala Asp Arg Leu Ile Val Glu Leu Lys 115 Gly Lys Arg Met Ala Ala Gly Val Val Asp Glu Gly Gly Glu 130 Ile Ser Leu Pro Asn Ala Asn Ile Ala Ser Glu Val Val Val Glu Gln Ile Ser Leu Pro Asn Ala Asn Ile Ala Ser Glu Val Val Val Glu	Ala	Val	Ile	Glu 20	Cys	Asn	Gly	Val		Tyr	Glu	Val	Val		Thr	Pro	
Asn Glu Ser Arg Glu Met Phe Ser Val Leu Gln Thr Val Ser Gly Leu Gly Pro Arg Leu Ala Leu Ala Cys Glu Ser Val Leu Ser Pro Leu Glu 95 Ile Ser Gln Ala Ile Thr Asn Ala Asp Ala Lys Thr Leu Gln Arg Val 100 Pro Gly Val Gly Lys Arg Met Ala Asp Arg Leu Ile Val Glu Leu Lys 125 Gly Lys Val Ala Ala Phe Ala Ala Gly Val Val Asp Glu Gly Gly Glu 130 Gln Ile Ser Leu Pro Asn Ala Asn Ile Ala Ser Glu Val Val Val Glu Gln Ile Ser Leu Pro Asn Ala Asn Ile Ala Ser Glu Val Val Glu	Asn	Thr		Ser	Gln	Leu	Val		Gly	Glu	Glu	Ala		Val	Leu	Thr	
Gly Pro Arg Leu Ala Leu Ala Cys Glu Ser Val Leu Ser Pro Leu Glu 95 Ile Ser Gln Ala Ile Thr Asn Ala Asp Ala Lys Thr Leu Gln Arg Val 100 Pro Gly Val Gly Lys Arg Met Ala Asp Arg Leu Ile Val Glu Leu Lys 125 Gly Lys Val Ala Ala Phe Ala Ala Gly Val Val Asp Glu Gly Gly Glu 130 Gln Ile Ser Leu Pro Asn Ala Asn Ile Ala Ser Glu Val Val Val Glu Glu Ile Ser Leu Pro Asn Ala Asn Ile Ala Ser Glu Val Val Glu	Thr	Met 50	Val	Val	Arg	Glu		Ala	Met	Lys	Leu		Gly	Phe	Ile	Asp	
Ile Ser Gln Ala Ile Thr Asn Ala Asp Ala Lys Thr Leu Gln Arg Val 100 Pro Gly Val Gly Lys Arg Met Ala Asp Arg Leu Ile Val Glu Leu Lys 115 Gly Lys Val Ala Ala Phe Ala Ala Gly Val Val Asp Glu Gly Gly Glu 130 Gln Ile Ser Leu Pro Asn Ala Asn Ile Ala Ser Glu Val Val Val Glu	Asn 65	Glu	Ser	Arg	Glu		Phe	Ser	Val	Leu		Thr	Val	Ser	Gly		
Pro Gly Val Gly Lys Arg Met Ala Asp Arg Leu Ile Val Glu Leu Lys 115 120 125 Gly Lys Val Ala Ala Phe Ala Ala Gly Val Val Asp Glu Gly Gly Glu 130 135 140 Gln Ile Ser Leu Pro Asn Ala Asn Ile Ala Ser Glu Val Val Val Glu	Gly	Pro	Arg	Leu		Leu	Ala	Cys	Glu		Val	Leu	Ser	Pro		Glu	
Gly Lys Val Ala Ala Phe Ala Ala Gly Val Val Asp Glu Gly Glu 130 135 140 Gln Ile Ser Leu Pro Asn Ala Asn Ile Ala Ser Glu Val Val Val Glu	Ile	Ser	Gln	Ala 100	Ile	Thr	Asn	Ala		Ala	Lys	Thr	Leu		Arg	Val	
Gln Ile Ser Leu Pro Asn Ala Asn Ile Ala Ser Glu Val Val Glu	Pro	Gly	Val 115	Gly	Lys	Arg	Met		Asp	Arg	Leu	Ile	_	Glu	Leu	Lys	
1/5																	
	Gly	Lys 130	Val	Ala	Ala	Phe		Ala	Gly	Val	Val		Glu	Gly	Gly	Glu	

Gln Val Ser Gln Ala Leu Val Gly Leu Gly Phe Ser Glu Lys Gln Ser 165 170 175

Asp Asp Ala Val Ser Phe Val Leu Ala Ala Asp Pro Ser Leu Asp Thr 180 185 190

Ser Gly Ala Leu Arg Ala Ala Leu Ala Lys Leu Ser Gly Lys 195 200 205

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<211> 735

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<220>

<221> CDS

<222> (101)..(712)

<223> RXN00172

<400> 83

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ttt aag gaa caa aca act aac ccg aga agt caa cga gtt tct tat ttg $\,$ 163 Phe Lys Glu Gln Thr Thr Asn Pro Arg Ser Gln Arg Val Ser Tyr Leu $\,$ 10 $\,$ 15 $\,$ 20

cgt gtc tct agc acc gat cag aat ctg gct cga caa cgt gaa gct gtt 211 Arg Val Ser Ser Thr Asp Gln Asn Leu Ala Arg Gln Arg Glu Ala Val 25 30 35

aac cat tcc ggt cat att gat cgt gag ttc aca gat gag ctt tcc ggt 259
Asn His Ser Gly His Ile Asp Arg Glu Phe Thr Asp Glu Leu Ser Gly
40 45

ggc gcc aaa tca cac aga cct ggc ttg gaa gac tgc att aat tat ctt 307 Gly Ala Lys Ser His Arg Pro Gly Leu Glu Asp Cys Ile Asn Tyr Leu
55

cgc gag gat gat gtt ctt gtc gtc gca tcc att gac cga ctt gca cgc 355
Arg Glu Asp Asp Val Leu Val Val Ala Ser Ile Asp Arg Leu Ala Arg
70 75 80

tcg ctg gtt gat tta cgc gtc atc att gac cgc atc aca gac aaa ggc 403 Ser Leu Val Asp Leu Arg Val Ile Ile Asp Arg Ile Thr Asp Lys Gly

gca tcg gtc att ttt ctc aaa gag aat ttg act ttc gct gca ggc cgc 451 Ala Ser Val Ile Phe Leu Lys Glu Asn Leu Thr Phe Ala Ala Gly Arg

gat gat cct cga gca aac ctc atg ctc ggt att ttg ggc agt ttc gca 499 Asp Asp Pro Arg Ala Asn Leu Met Leu Gly Ile Leu Gly Ser Phe Ala 120 125 130

gaa ttt gaa cgc tca att att cgc gag cgc caa gca gaa ggt att gcc 547

595

643

691

735

City Goa aaa aag goc go aag tat goa ggt cgc cca aaa goc ctc gac Leu Ala Lys Lys Ala Gly Lys Tyr Ala Gly Arg Pro Lys Ala Leu Aap 155 aag gaa caa ata caa gaa goc aag aag atat goc ggt cgc cca aaa goc ctc gac Leu Ala Lys Lys Ala Gly Lys Tyr Ala Gly Arg Pro Lys Ala Leu Aap 150 aag gaa caa ata caa gaa goc aag aag atat gat ggt caa ggt gaa aca Lys Glu Gln Ile Gln Glu Ala Lys Asp Met Ile Ala Gln Gly Glu Thr 170 aaa tot got gtc goc aag cat ttt ggt att aat cgc tog acc ttg tac Lys Ser Ala Val Ala Lys His Phe Gly Ile Asn Arg Ser Thr Leu Tyr 185 gaa tat ctc aaa aat cot gac tagettgaga atcaactatg cga Glu Tyr Leu Lys Asn Pro Asp 200 <a href<="" th=""><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th>_</th><th></th>																_	
Leu Ala Lys Lys Ala Gly Lys Tyr Ala Gly Arg Pro Lys Ala Leu Asp 150 155 166 168 169 169 169 165 165 165 165 165 165 165 165 165 165	G1	.u	Phe 135	Glu	Arg	Ser	Ile			Glu	Arg	Gln		Glu	Gly	Ile	Ala
Lys Glu Gln Ile Gln Glu Ala Lys Asp Met Ile Ala Gln Gly Glu Thr 170 170 175 175 175 and a Gly Glu Thr 180 170 175 175 and a Gly Glu Glu Thr 180 175 and a Gly Glu Glu Thr 180 180 180 180 180 180 180 180 180 180	Le	u	gca Ala	aaa Lys	aag Lys	gcc Ala	Gly	aag Lys	tat Tyr	gca Ala	ggt Gly	Arg	cca Pro	aaa Lys	gcc Ala	ctc Leu	Asp
Gaa tat ctc aaa aat cct gac tagattgaga atcaactatg cga Glu Tyr Leu Lys Asn Pro Asp 200 <pre> </pre> <pre></pre>	aa Ly	g	gaa Glu	caa Gln	ata Ile	Gln	gaa Glu	gca Ala	aaa Lys	gat Asp	Met	atc Ile	gct Ala	caa Gln	ggt Gly	Glu	aca Thr
Clu Tyr Leu Lys Asn Pro Asp 200	aa Ly	a s	tct Ser	gct Ala	Val	gcc Ala	aag Lys	cat His	ttt Phe	Gly	att Ile	aat Asn	cgc Arg	tcg Ser	Thr	ttg Leu	tac Tyr
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Met 1 Phe Gly Ser Ser Ser Phe Lys Glu Gln Thr 10 Thr Asn Pro Arg Ser Gln 15 Arg Val Ser Tyr Leu Arg Val Ser Ser Thr Asp Gln Asn Leu Ala Arg 20 Ser Ser Thr Asp Gln Asn Leu Ala Arg 30 Gln Arg Glu Ala Val Asn His 35 Ser Gly His 11e Asp Arg Glu Phe Thr 45 Asp Glu Leu Ser Gly Gly Ala Lys Ser His Arg Pro Gly Leu Glu Asp 50 Ser Glu Leu Arg Glu Asp Asp Val Leu Val Val Ala Ser Ile 80 Cys Ile Asn Tyr Leu Arg Glu Asp Asp Val Leu Val Val Val Ala Ser Ile 80 Ser Leu Val Asp Leu Arg Val Ile Ile Asp Arg 95 Asp Arg Leu Ala Arg Ser Leu Val Asp Leu Arg Val Ile Ile Asp Arg 95 Arg Val Ile Ile Asp Arg 95 Ile Thr Asp Lys Gly Ala Ser Val Ile Phe Leu Lys Glu Asn Leu Thr 100 Ser Ile 110 Phe Ala Ala Gly Arg Asp Asp Pro Arg Ala Asn Leu Met Leu Gly Ile 115 Leu Gly Ser Phe Ala Glu Phe Glu Arg Ser Ile Ile Arg Glu Arg Gln 130 Ala Glu Gly Ile Ala Leu Ala Lys Lys Ala Gly Lys Tyr Ala Gly Arg 145 Ser Leu Ala Lys Ala Lys Asp Met Ile 170 Pro Lys Ala Leu Asp Lys Glu Gln Ile Gln Glu Ala Lys His Phe Gly Ile Asn	<2 <2	11: 12:	> 20 > PR) 4 RT	ebact	ceri	ım g]	utan	nicum	n							
25 30 Gln Arg Glu Ala Val Asn His Ser Gly His Ile Asp Arg Glu Phe Thr 40 50 Leu Ser Gly Gly Ala Lys Ser His Arg Pro Gly Leu Glu Asp 65 leu Asn Tyr Leu Arg Glu Asp Asp Val Leu Arg Val Val Ala Ser Ile 80 Asp Arg Leu Ala Arg Ser Leu Val Asp Leu Arg Val Ile Ile Asp Arg 95 leu Thr 100 Asp 100 Asp 110 Asp 100 Asp Asp Pro Arg Ala Asn Leu Met Leu Gly Ile 115 Asp 115 Asp 125 Ala Glu Gly Ile 115 Asp Arg Glu Asp Arg Ala Leu Arg Ser Leu Val Arg Arg Ala Asn Leu Met Leu Gly Ile 115 Asp 135 Ala Glu Gly Ile 155 Ala Glu Gly Ile 156 Asp Arg Ala Ala Gly Arg Asp Asp Pro Arg Ala Gly Lys Tyr Ala Gly Arg 145 Ala Glu Gly Ile 150 Ala Leu Asp Lys Glu Gln Ile Gln Glu Ala Lys Asp Met Ile 175 Ala Gln Gly Glu Thr Lys Ser Ala Val Ala Lys His Phe Gly Ile Asn	Ме	t I			Ser		Phe	Lys	Glu	Gln		Thr	Asn	Pro	Arg		Gln
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Cys Ile Asn Tyr Leu Arg Glu Asp Asp Val Leu Val Val Ala Ser Ile 80 Asp Arg Leu Ala Arg Ser Leu Val Asp Leu Arg Val Ile Ile Asp Arg Ser Leu Val Ile Thr Asp Lys Gly Ala Ser Val Ile Phe Leu Lys Glu Asn Leu Thr 100 Phe Ala Ala Gly Arg Asp Asp Pro Arg Ala Asn Leu Met Leu Gly Ile 115 Leu Gly Ser Phe Ala Glu Phe Glu Arg Ser Ile Ile Arg Glu Arg Gln 130 Ala Glu Gly Ile Ala Leu Ala Lys Lys Ala Gly Lys Tyr Ala Gly Arg 145 Pro Lys Ala Leu Asp Lys Glu Gln Ile Gln Glu Ala Lys Asp Met Ile 165 Ala Gln Gly Glu Thr Lys Ser Ala Val Ala Lys His Phe Gly Ile Asn	Gl	n A	Arg		Ala	Val	Asn	His		Gly	His	Ile	Asp		Glu	Phe	Thr
Asp Arg Leu Ala Arg Ser Leu Val Asp Leu Arg Val Ile Ile Asp Arg 95 Ile Thr Asp Lys Gly Ala Ser Val Ile Phe Leu Lys Glu Asn Leu Thr 100 Phe Ala Ala Gly Arg Asp Asp Pro Arg Ala Asn Leu Met Leu Gly Ile 115 Leu Gly Ser Phe Ala Glu Phe Glu Arg Ser Ile Ile Arg Glu Arg Gln 130 Ala Glu Gly Ile Ala Leu Asp Lys Glu Gln Ile Gln Glu Ala Lys Asp Met Ile 165 Ala Gln Gly Glu Thr Lys Ser Ala Val Ala Lys His Phe Gly Ile Asn	Ası	o (51u 50	Leu	Ser	Gly	Gly		Lys	Ser	His	Arg		Gly	Leu	Glu	Asp
Ille Thr Asp Lys Gly Ala Ser Val Ille Phe Leu Lys Glu Asn Leu Thr 100 Phe Ala Ala Gly Arg Asp Asp Pro Arg Ala Asn Leu Met Leu Gly Ille 115 Ser Phe Ala Glu Phe Glu Arg Ser Ille Ille Arg Glu Arg Gln 130 Phe Iso Phe Ala Leu Ala Lys Lys Ala Gly Lys Tyr Ala Gly Arg 145 Pro Lys Ala Leu Asp Lys Glu Gln Ille Gln Gly Ala Lys Asp Met Ille 170 Ala Gly Glu Thr Lys Ser Ala Val Ala Lys His Phe Gly Ille Asn	Су: 6:	s] 5	Ile	Asn	Tyr	Leu		Glu	Asp	Asp	Val		Val	Val	Ala	Ser	
Phe Ala Ala Gly Arg Asp Asp Pro Arg Ala Asn Leu Met Leu Gly Ile 115 Leu Gly Ser Phe Ala Glu Phe Glu Arg Ser Ile Ile Arg Glu Arg Gln 130 Glu Gly Ile Ala Leu Ala Lys Lys Ala Gly Lys Tyr Ala Gly Arg 145 Lys Ala Leu Asp Lys Glu Gln Ile Gln Glu Ala Lys Asp Met Ile 165 Lys Glu Gln Glu Gly Glu Thr Lys Ser Ala Val Ala Lys His Phe Gly Ile Asn	Asp	o P	Arg	Leu	Ala		Ser	Leu	Val	Asp		Arg	Val	Ile	Ile		Arg
Leu Gly Ser Phe Ala Glu Phe Glu Arg Ser Ile Ile Arg Glu Arg Gln 130 Ala Glu Gly Ile Ala Leu Ala Lys Lys Ala Gly Lys Tyr Ala Gly Arg 145 Pro Lys Ala Leu Asp Lys Glu Gln Ile Gln Glu Ala Lys Asp Met Ile 175 Ala Gln Gly Glu Thr Lys Ser Ala Val Ala Lys His Phe Gly Ile Asn	Ile	e 1	hr.	Asp	Lys 100	Gly	Ala	Ser	Val		Phe	Leu	Lys	Glu		Leu	Thr
Ala Glu Gly Ile Ala Leu Ala Lys Lys Ala Gly Lys Tyr Ala Gly Arg 155	Phe	∋ <i>P</i>	Ala .	Ala 115	Gly	Arg	Asp	Asp		Arg	Ala	Asn	Leu		Leu	Gly	Ile
Pro Lys Ala Leu Asp Lys Glu Gln Ile Gln Glu Ala Lys Asp Met Ile 165 170 175 Ala Gln Gly Glu Thr Lys Ser Ala Val Ala Lys His Phe Gly Ile Asn	Let	ı (30	Ser	Phe	Ala	Glu		Glu	Arg	Ser	Ile		Arg	Glu	Arg	Gln
Ala Gln Gly Glu Thr Lys Ser Ala Val Ala Lys His Phe Gly Ile Asn	Ala 145	a G	lu (Gly	Ile	Ala		Ala	Lys	Lys	Ala		Lys	Tyr	Ala	Gly	
100	Pro	L	ys .	Ala	Leu		Lys	Glu	Gln	Ile		Glu	Ala	Lys	Asp		Ile
	Ala	a G	ln (Gly	Glu 180	Thr	Lys	Ser	Ala		Ala	Lys	His	Phe		Ile	Asn

Ar	g Se	r Th	r Lei 5	а Ту:	r Glı	а Ту	r Lei 200		s Ası	n Pro	o Asp	Þ				
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		cac									atg	ttt Phe	ggt	agt		115
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Asp	Le	ı Gl:	n Il 2	e Gl _i 5	y Me	t Th	r Arq	g Trp 30	p Phe	e Le	u Sei	r Ası	o Gli 35		a Gln	
gcc Ala	cgt Arg	tti g Phe 4(- AS	c gat o Asp	gao Asp	c cgo Aro	g att g Ile 45	e Arc	g gco g Ala	c ato a Ile	c gaa e Glu	a aaq 1 Lys 50	Met	g ggo	c aag y Lys	259
atc Ile	gca Ala 55	Arc	g aaa g Lys	a aat s Asr	caq n Glr	g tgc n Cys 60	s Glu	tto Phe	att E Ile	gto Val	g cto Leu 65	Ala	ggc Gly	gad Asp	gtc Val	307
ttc Phe 70	gag Glu	cac His	aac Asr	c tct n Ser	tta Leu 75	ı Glu	caa Gln	. cgc . Arg	acc Thr	act Thr	Gly	. cgt . Arg	gcc Ala	tta Leu	gaa Glu 85	355
gcc Ala	tta Leu	cga Arg	tco Ser	tta Leu 90	. Lys	ctg Leu	ccg Pro	gtt Val	tat Tyr 95	Leu	ctg Leu	ccg Pro	ggt Gly	aac Asn 100		403
gat Asp	cct Pro	tta Leu	aca Thr 105	gcg Ala	gat Asp	tcg Ser	ttg Leu	ttt Phe 110	tac Tyr	cgc Arg	gcc Ala	aaa Lys	gat Asp 115	att Ile	gat Asp	451
ggc Gly	gtg Val	aca Thr 120	atc Ile	ttg Leu	tcg Ser	gac Asp	acc Thr 125	acc Thr	gtg Val	cat His	ggg Gly	gtg Val 130	gcc Ala	cct Pro	Gly ggg	499
gtg Val	gaa Glu 135	att Ile	att Ile	gga Gly	gca Ala	ccc Pro 140	ttg Leu	ctg Leu	cac His	aag Lys	atg Met 145	gct Ala	act Thr	tca Ser	gat Asp	547
cta Leu 150	gtg Val	gca Ala	gaa Glu	gca Ala	ttg Leu 155	aaa Lys	gat Asp	ttg Leu	gaa Glu	cca Pro 160	acc Thr	tcc Ser	aac Asn	gtc Val	cgt Arg 165	595
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gct Ala	gac Asp	tta Leu	atc Ile 185	gat Asp	ctg Leu	Asn	act Thr	Val	Glu	gcc Ala	aaa Lys	ttg Leu	gct Ala 195	gac Asp	ggt Gly	691
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gtc g Val G	gag o	gtg Val	ggg Gly	aag Lys·	tgg Trp	acc Thr	ttc Phe	cac His .	gct Ala	tta Leu	tct Ser	aaa Lys	gaa Glu	atc Ile	acc Thr	931

265 270 275 tcg ggt acc gat gtg gaa gat ttc ttg gat acc ttg cag gca tac cct 979 Ser Gly Thr Asp Val Glu Asp Phe Leu Asp Thr Leu Gln Ala Tyr Pro 280 285 gat aaa tot oga aca gto ato aaa tat ggt oto ogo gga aco ato aco 1027 Asp Lys Ser Arg Thr Val Ile Lys Tyr Gly Leu Arg Gly Thr Ile Thr 300 ctg gaa caa aac agg cgt ttg gaa gaa ggc atc gct ggg tta gaa gat 1075 Leu Glu Gln Asn Arg Arg Leu Glu Glu Gly Ile Ala Gly Leu Glu Asp 315 320 gto tit got toa oto aag oot ogg gaa ogo aco act gao oto gtg otg 1123 Val Phe Ala Ser Leu Lys Pro Arg Glu Arg Thr Thr Asp Leu Val Leu 330 gag cca ggg gag gaa gaa tta gcc aat ctc gat gcc aca ggt tac gcc 1171 Glu Pro Gly Glu Glu Leu Ala Asn Leu Asp Ala Thr Gly Tyr Ala 350 gct gaa gta ttg cga gag ctc gct gac tct gtg gtc aat ggt gca gcg 1219 Ala Glu Val Leu Arg Glu Leu Ala Asp Ser Val Val Asn Gly Ala Ala 365 ccg gaa gaa gac cgc gat gcg ctc aac cta ttg ttc cga cta agc cgg 1267 Pro Glu Glu Asp Arg Asp Ala Leu Asn Leu Leu Phe Arg Leu Ser Arg 385 gag gtc taagacatgc gtattcatga aat 1296 Glu Val 390 <210> 88 <211> 391 <212> PRT <213> Corynebacterium glutamicum <400> 88 Met Ser Thr Val His Asp Glu Met Gly Val Met Asn Thr Thr Val Lys Phe Leu His Ser Ser Asp Leu Gln Ile Gly Met Thr Arg Trp Phe Leu 25 Ser Asp Glu Ala Gln Ala Arg Phe Asp Asp Asp Arg Ile Arg Ala Ile Glu Lys Met Gly Lys Ile Ala Arg Lys Asn Gln Cys Glu Phe Ile Val 55 Leu Ala Gly Asp Val Phe Glu His Asn Ser Leu Glu Gln Arg Thr Thr 70 75 Gly Arg Ala Leu Glu Ala Leu Arg Ser Leu Lys Leu Pro Val Tyr Leu 90 Leu Pro Gly Asn His Asp Pro Leu Thr Ala Asp Ser Leu Phe Tyr Arg 100 105

Ala Lys Asp Ile Asp Gly Val Thr Ile Leu Ser Asp Thr Thr Val His 115 120 125

Gly Val Ala Pro Gly Val Glu Ile Ile Gly Ala Pro Leu His Lys 130 135 140

Met Ala Thr Ser Asp Leu Val Ala Glu Ala Leu Lys Asp Leu Glu Pro 145 150 155 160

Thr Ser Asn Val Arg Ile Ala Val Gly His Gly Gln Ala Glu Ala Arg 165 170 175

Thr Thr Asp His Arg Ala Asp Leu Ile Asp Leu Asn Thr Val Glu Ala 180 185 190

Lys Leu Ala Asp Gly Thr Ile Asp Tyr Leu Ala Leu Gly Asp Thr His 195 200 205

Ser Ala Gln Pro Val Gly Thr Ser Gly Lys Val Trp Phe Ser Gly Ala 210 215 220

Pro Glu Thr Thr Asp Phe His Asp Leu Asp Pro Asp Arg Val Gly Gly 235 240

Glu Val Asn Ser Gly Lys Val Leu Ile Val Ser Ala Ser Lys Gly Asp 245 250 255

Val Ser Val Glu Glu Val Glu Val Gly Lys Trp Thr Phe His Ala Leu 260 265 270

Ser Lys Glu Ile Thr Ser Gly Thr Asp Val Glu Asp Phe Leu Asp Thr 275 280 285

Leu Gln Ala Tyr Pro Asp Lys Ser Arg Thr Val Ile Lys Tyr Gly Leu 290 295 300

Arg Gly Thr Ile Thr Leu Glu Gln Asn Arg Arg Leu Glu Glu Gly Ile 305 310 315 320

Ala Gly Leu Glu Asp Val Phe Ala Ser Leu Lys Pro Arg Glu Arg Thr 325 330 335

Thr Asp Leu Val Leu Glu Pro Gly Glu Glu Glu Leu Ala Asn Leu Asp 340 345 350

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Val Asn Gly Ala Ala Pro Glu Glu Asp Arg Asp Ala Leu Asn Leu Leu 370 375 380

Phe Arg Leu Ser Arg Glu Val 385 390

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	cag Gln															835
	cgt Arg															883
	acg Thr															931
	ttc Phe		_	_										_	_	979
	gcg Ala 295		_	_		-			_				_			1027
	ggc Gly					_	_			_		_	_	_		1075
	gac Asp															1123
	tca Ser															1171
	att Ile	-			_	_	_					_				1219
	gcc Ala 375															1267
	gag Glu															1315
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	tca Ser	-	_					_	_					_		1411
	ctc Leu															1459

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Arg Ala Thr Ala Leu Ile His Asp His Ile Thr Lys Ala Gln Glu Ile

Thr Ile Ile Thr Asp Phe Asp Met Asp Gly Ile Ser Ala Gly Val Ile

65 70 80

Ala Tyr Ala Gly Leu Ala Glu Leu Gly Ala Gln Val Asn Met Val Val 85 90 95

Pro Asp Tyr Arg Gly Glu Arg Asn Val Thr Ala Ser Asp Ile Asp Arg 100 105 110

Ala Leu Glu Leu Tyr Pro Ala Thr Ser Leu Ile Ile Thr Cys Asp Val 115 120 125

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Ala Val Leu Val Thr Asp His His Met Glu Val Glu Pro Cys Gln Ala 145 150 155 160

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Thr Arg Pro Thr Val Lys Gln Ala Ile Ala Leu Leu Arg Leu Ala Ile 225 230 235 240

Pro Gln Val Ser Lys Asn Arg Phe Gly Gly Trp Asp Thr Tyr Ala Ala 245 250 255

Arg Ser Val Asn Pro Asp Thr Ser Thr Leu Met His Ile Val Asn Ala 260 265 270

Ser Gln His Asp His Arg Phe Ile Ala Ala Phe Gln Gly Ile Ser Ile 275 280 285

Leu Leu Gly Glu Leu Ile Ala Gln Lys Lys Leu Val Asn Ile Asp Asn 290 295 300

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Thr Arg Arg Val Gly Gly Asp Met His Asp Ser Phe Leu Val Phe Ala 325 330 335

Pro His Ala Ala Leu Ala Ser Gln Pro Ser Met Asn Pro Asn Arg His 340 345 350

Ala Ala Ile Ser Arg Ile Ile Asp Asn Asn Glu Arg Arg Lys Glu Leu 355 360 365

Ser Lys Ser Ser Tyr Ala Ala Val His Ser Ser Asp Gln Pro Tyr Ala 370 375 380

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Ala Ser Gln Leu Thr Arg Glu Ser Asp Val Pro Ala Ile Val Ile Asn 405 410 415

Pro Asp Thr Leu Ser Gly Ser Ala Arg Ser Pro Glu Trp Ala Pro Ile 420 425 430

Ile Thr Gln Val Asn Thr Leu Ser Ala Gln Gly His Gly Gly Ile His 435 440 445

Ala Ala Gly His Glu Tyr Ala Cys Gly Met Arg Phe Asp Asn His Asp 450 455 460

Asp Ile Val Thr Phe Val Ala Thr Leu Asp Ala Leu Asp Lys Asn Thr 465 470 475 480

Pro Arg Glu Ala Gln Pro Ala Asp Leu His Leu Val Asp Ile Asp His 485 490 495

Ala Arg Pro Val Leu Asp Asn Pro Ser Leu Thr Gln Glu Leu Ser Thr 500 505 510

Val Asp Ala Ala Val Asp Ala Ala Gln Leu Leu Val Leu Ile Asp Gln 515 520 525

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Asp Val Thr Phe Arg Pro Ala Glu Thr Glu Phe Lys Val Met Gly Gln 545 550 550 560

His His Gln His Leu Lys Val Ile Thr His Ser Gly Leu Thr Leu Leu 565 570 575

Trp Trp Asn Lys Ala Gln Gln Leu Asp Glu Ile Ala Gln Ser Glu Leu 580 585 590

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Tyr Thr Pro Asp Val Ile Ala Ile Glu Arg Val Phe Glu Arg Gly Asn 65 70 75 80

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Ala Ala Ala Glu Arg Gly Leu Pro Val His Met Tyr Thr Pro Ser Glu 100 105 110

Val Lys Lys Ala Ile Ser Gly Asn Gly Arg Ala Asp Lys Lys Gln Met 115 120 125

Thr Val Met Ile Thr Arg Ile Leu Gly Leu Gly Glu Pro Pro Lys Pro 130 135 140

Ala Asp Ala Ala Asp Ala Leu Ser Leu Ala Val Cys His Cys Trp Arg 145 150 155 160

Ala Pro Met Leu Met Arg Ala Gln Ser Gln Tyr Ser Glu Gln Glu Leu 165 170 175

Glu Lys Arg Arg Val Gln Gln Gly Lys Leu Gly Lys Ala Lys Ser 180 185 190

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340

Arg Gly Pro Arg Arg Lys Gly Val Arg Tyr Phe Gly Pro Tyr Ser His 40 Ala Trp Ala Val Arg Glu Thr Leu Asp Leu Leu Thr Arg Val Phe Pro Met Arg Thr Cys Ser Lys Gly Val Phe Asn Arg His Glu Ser Leu Gly Arg Pro Cys Leu Leu Gly Tyr Ile Asp Lys Cys Ala Ala Pro Cys Val Gly Arg Val Ser Glu Glu Glu His Arg Glu Ile Val Asp Gly Phe Thr 110 Ser Phe Met Ala Gly His Thr Asp Lys Val Thr Arg Lys Leu Asn Ala Asp Met Met Ala Ala Ala Glu Glu Leu Asp Phe Glu Arg Ala Ala Arg 135 Leu Arg Asp Asp Leu Glu Ala Ile Asp Lys Val Met Glu Lys Gln Ala 150 Val Val Leu Gly Asp Gly Thr Asp Ala Asp Ile Ile Ala Phe Ala Thr Asp Gln Leu Glu Ala Ala Val Gln Val Phe Asn Ile Arg Gly Gly Arg Ile Arg Gly Gln Arg Gly Trp Val Val Glu Lys Pro Gly Asp Tyr Ala Gly Leu Leu Val Asp Ala Thr Thr Gln Pro Glu Gly Asp Ala Pro Glu 215 Thr Asp Pro Ala Leu Pro Phe Leu Met Gln Asp Phe Leu Val Gln Phe 230 235 Tyr Gly Asp Ala Val Glu Arg Ala Glu Thr Glu Ala Lys Glu Asp Ala Ala Val Ile Glu Arg Arg Gly Val Asp Lys His Ser Phe Glu Glu Ala Ala Pro Val Thr Arg Ala Ser Val Val Pro Arg Glu Ile Leu Val Gln 280 Val Ala Pro Asn Glu Ala Glu Gln Thr Leu Lys Val Leu Glu Glu Leu Arg Gly Ala Gly Val Asp Ala Arg Val Pro Gln Arg Gly Asp Lys Arg 310 315 Ala Leu Met Glu Thr Val Glu Arg Asn Ala Lys Glu Leu Leu Lys Gln 330 His Lys Leu Lys Arg Val Gly Asp Leu Thr Ala Arg Ser Ala Ala Leu

345

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gto Val	cgo Aro	c gg g Gl	t tad y Tyn	aaq Lys 730	Pro	ggc Gly	e cgc Arg	ttc Phe	Ser 735	Phe	aat Asr	att Ile	aag Lys	ggt Gly 740	gga Gly	2323
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Ser Ser Leu Ala Phe Asp Thr Ile Phe Ala Glu Gly Gln Arg Arg Tyr 35 40 45

Val Glu Ser Leu Ser Ser Tyr Ala Arg Met Phe Leu Gly Gln Met Asp 50 55 60

Lys Pro Asp Val Asp Leu Ile Asp Gly Leu Ser Pro Ala Val Ser Ile 65 70 75 80

Asp Gln Lys Ser Thr Asn Arg Asn Pro Arg Ser Thr Val Gly Thr Ile $85 \hspace{1cm} 90 \hspace{1cm} 95$

Thr Glu Val Tyr Asp Tyr Leu Arg Leu Leu Tyr Ala Arg Ala Gly Thr 100 105 110

Ala His Cys Pro Val Cys Asp Ala Arg Val Glu Arg Gln Thr Pro Gln 115 120 125

Gln Met Val Asp Gln Ile Leu Gly Met Glu Glu Gly Leu Lys Phe Gln 130 135 140

Ile Leu Ala Pro Val Val Arg Thr Arg Lys Gly Glu Phe Val Asp Leu 145 150 155 160

Phe Ala Asp Leu Ala Ser Gln Gly Tyr Ser Arg Val Arg Val Asp Gly 165 170 175

Glu Val His Gln Leu Ser Asp Pro Pro Lys Leu Glu Lys Gln Ile Lys 180 185 190

His Asp Ile Asp Val Val Val Asp Arg Leu Gln Val Lys Ala Ser Gln 195 200 205

Lys Gln Arg Leu Thr Asp Ser Met Glu Thr Ala Leu Arg Leu Ala Asp 210 215 220

Gly Val Ala Val Leu Glu Phe Val Gly Leu Glu Glu Asp Asp Pro Asn 225 235 240

Arg Leu Arg Arg Phe Ser Glu Lys Met Ser Cys Pro Asn Gly His Ala 245 250 255

Leu Thr Val Asp Glu Leu Glu Pro Arg Ala Phe Ser Phe Asn Ser Pro 260 260 270

Tyr Gly Ala Cys Pro Ala Cys Asp Gly Leu Gly Val Arg Thr Glu Val

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aat agg ctt cgt cga ttc tct gaa aag atg agc tgc cct aac ggt cac

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576

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gct Ala 865	gaa Glu	gtt Val	gcg Ala	ggt Gly	tcc Ser 870	tac Tyr	acc Thr	ggc Gly	caa Gln	ttc Phe 875	ctt Leu	aaa Lys	gag Glu	ttg Leu	ttg Leu 880	2640
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325 330 Thr Arg Glu Val Pro Cys Pro Thr Cys Lys Gly Ala Arg Leu Lys Pro 345 Glu Ile Leu Ala Val Arg Leu Asp Ser Gly Ser His Gly Ala Leu Ser Ile Ala Gly Leu Thr Ala Leu Ser Val His Glu Ala Phe Glu Phe Leu 375 Asp Asn Leu Thr Leu Gly Lys Arg Glu Glu Met Ile Ala Gly Ala Val 395 Leu Lys Glu Ile His Ala Arg Leu Lys Phe Leu Leu Asp Val Gly Leu 410 Ser Tyr Leu Thr Leu Asp Arg Ala Ala Gly Thr Leu Ser Gly Gly Glu Ala Gln Arg Ile Arg Leu Ala Thr Gln Ile Gly Ser Gly Leu Ala Gly 440 Val Leu Tyr Val Leu Asp Glu Pro Ser Ile Gly Leu His Gln Arg Asp 455 Asn Gln Arg Leu Ile Thr Thr Leu Glu His Leu Arg Asp Ile Gly Asn 470 Thr Leu Ile Val Val Glu His Asp Glu Asp Thr Ile Arg Arg Ala Asp Trp Leu Val Asp Ile Gly Pro Arg Ala Gly Glu Phe Gly Gly Glu Val 505 Val Tyr Gln Gly Glu Pro Lys Gly Ile Leu Asp Cys Glu Glu Ser Leu Thr Gly Ala Tyr Leu Ser Gly Arg Arg Thr Leu Gly Val Pro Asp Thr 535 Arg Arg Glu Ile Asp Lys Glu Arg Gln Leu Lys Val Val Gly Ala Arg Glu Asn Asn Leu Gln Gly Ile Asp Val Lys Ile Pro Leu Gly Val Leu 570 Cys Cys Ile Thr Gly Val Ser Gly Ser Gly Lys Ser Thr Leu Val Asn 580 Gln Ile Leu Ala Lys Val Leu Ala Asn Lys Leu Asn Arg Ala Arg Gln 600 Val Pro Gly Arg Ala Lys Arg Val Glu Gly Leu Glu His Leu Asp Lys Leu Val Gln Val Asp Gln Ser Pro Ile Gly Arg Thr Pro Arg Ser Asn 630 Pro Ala Thr Tyr Thr Gly Val Phe Asp Lys Val Arg Asn Leu Phe Ala 645 650

Glu Thr Thr Glu Ala Lys Val Arg Gly Tyr Lys Pro Gly Arg Phe Ser $660 \hspace{1.5cm} 665 \hspace{1.5cm} 670$

Phe Asn Ile Lys Gly Gly Arg Cys Glu Ala Cys Gln Gly Asp Gly Thr 675 680 685

Leu Lys Ile Glu Met Asn Phe Leu Pro Asp Val Tyr Val Pro Cys Glu 690 695 700

Val Cys Asp Gly Gln Arg Tyr Asn Arg Glu Thr Leu Glu Val Lys Tyr 705 710 715 720

Lys Gly Lys Asn Ile Ala Glu Val Leu Gly Met Pro Ile Ser Glu Ala 725 730 735

Ala Asp Phe Phe Glu Pro Ile Thr Ser Ile His Arg Tyr Leu Ala Thr 740 745 750

Leu Val Asp Val Gly Leu Gly Tyr Val Arg Leu Gly Gln Ala Ala Thr 755 760 765

Thr Leu Ser Gly Gly Glu Ala Gln Arg Val Lys Leu Ala Ala Glu Leu 770 780

Gln Lys Arg Ser Asn Gly Arg Thr Val Tyr Ile Leu Asp Glu Pro Thr 785 790 795 800

Thr Gly Leu His Phe Glu Asp Ile Arg Lys Leu Met Met Val Ile Glu 805 810 815

Gly Leu Val Asp Lys Gly Asn Ser Val Ile Ile Ile Glu His Asn Leu 820 825 830

Asp Val Ile Lys Ala Ala Asp Trp Ile Val Asp Met Gly Pro Glu Gly 835 840 845

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<223> RXA02563

<400> 101

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Met Met Pro Tyr Ile acc gat att gca gcg ctt gaa cat gtg ggt gtg gct gct gct tgg aca 163 Thr Asp Ile Ala Ala Leu Glu His Val Gly Val Ala Ala Ala Trp Thr

gag aag gtt cct gct ttt cgg gtg ttg aga gaa aag cgc atg ctg gac 211 Glu Lys Val Pro Ala Phe Arg Val Leu Arg Glu Lys Arg Met Leu Asp ttt cgt gcg ccg atc acc gtc ata acc ggg gaa aac ggt gtg ggt aag 259 Phe Arg Ala Pro Ile Thr Val Ile Thr Gly Glu Asn Gly Val Gly Lys tog aca ttg ctg gag gct atc gcg atc aat gcg ggc ttc gac aca gca 307 Ser Thr Leu Leu Glu Ala Ile Ala Ile Asn Ala Gly Phe Asp Thr Ala 60 ggt ggt gaa cac acc gga aag ttc aaa cct tcc gac aac cct ttg caa 355 Gly Gly Glu His Thr Gly Lys Phe Lys Pro Ser Asp Asn Pro Leu Gln act gtg gca aaa gca cac aag gga aaa gag ccg atg cgg ggg tat ttc 403 Thr Val Ala Lys Ala His Lys Gly Lys Glu Pro Met Arg Gly Tyr Phe ctg cgg gcg gaa act cat ttc aac gtc gcg tct gga tat cgc gat gag 451 Leu Arg Ala Glu Thr His Phe Asn Val Ala Ser Gly Tyr Arg Asp Glu gct ccc ggc tgg gtg aac ctt cat cac atg tcg cac ggg gag tcg gtg 499 Ala Pro Gly Trp Val Asn Leu His His Met Ser His Gly Glu Ser Val 125 atg cat att gtg cag aat gct ttt gtg ggc aag ggg ctg tat ctg atg 547 Met His Ile Val Gln Asn Ala Phe Val Gly Lys Gly Leu Tyr Leu Met gat gag cct gaa gcg ggg cta tcg ttc att cga cag atg gcg att ctg 595 Asp Glu Pro Glu Ala Gly Leu Ser Phe Ile Arg Gln Met Ala Ile Leu 155 gcg gag ctt aat ttt ctg gcg gaa agt ggt gcg caa att atc atc gtg 643 Ala Glu Leu Asn Phe Leu Ala Glu Ser Gly Ala Gln Ile Ile Val 170 175 acg cat tcg ccg gtg ttg atg gct att ccg ggt gca gaa att tgg gag 691 Thr His Ser Pro Val Leu Met Ala Ile Pro Gly Ala Glu Ile Trp Glu ttt agt gca tcg ggg gaa ctg cat cga ggg ttt gat ttt gag gtg aca 739 Phe Ser Ala Ser Gly Glu Leu His Arg Gly Phe Asp Phe Glu Val Thr 205 acg gcg ttt cga gcg cta cgt gac ttc ttt gag gat ccg gaa gaa att 787 Thr Ala Phe Arg Ala Leu Arg Asp Phe Phe Glu Asp Pro Glu Glu Ile 220 gct gag tac atg atg gac gtc atg atg gac aac aag ggg gag tcc 832 Ala Glu Tyr Met Met Asp Val Met Met Asp Asn Lys Gly Glu Ser

235

240

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855

<210> 102

<211> 244

<212> PRT

<213> Corynebacterium glutamicum

<400> 102

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Lys Arg Met Leu Asp Phe Arg Ala Pro Ile Thr Val Ile Thr Gly Glu 35 40 45

Asn Gly Val Gly Lys Ser Thr Leu Leu Glu Ala Ile Ala Ile Asn Ala 50 55 60

Gly Phe Asp Thr Ala Gly Gly Glu His Thr Gly Lys Phe Lys Pro Ser 65 70 75 80

Asp Asn Pro Leu Gln Thr Val Ala Lys Ala His Lys Gly Lys Glu Pro
85 90 95

Met Arg Gly Tyr Phe Leu Arg Ala Glu Thr His Phe Asn Val Ala Ser 100 105 110

Gly Tyr Arg Asp Glu Ala Pro Gly Trp Val Asn Leu His His Met Ser 115 120 125

His Gly Glu Ser Val Met His Ile Val Gln Asn Ala Phe Val Gly Lys

Gly Leu Tyr Leu Met Asp Glu Pro Glu Ala Gly Leu Ser Phe Ile Arg 145 150 155 160

Gln Met Ala Ile Leu Ala Glu Leu Asn Phe Leu Ala Glu Ser Gly Ala 165 170 175

Gln Ile Ile Val Thr His Ser Pro Val Leu Met Ala Ile Pro Gly
180 185 190

Asp Phe Glu Val Thr Thr Ala Phe Arg Ala Leu Arg Asp Phe Phe Glu 210 215 220

Asp Pro Glu Glu Ile Ala Glu Tyr Met Met Asp Val Met Met Asp Asn 225 235 235

Lys Gly Glu Ser

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													•			
Val	Val	Leu	Asn 185	Val	Gly	Glu	Glu	Ile 190	Asp	Arg	Asp	Arg	Phe 195	Leu	Arg	
cta Leu	ttg Leu	gta Val 200	gat Asp	att Ile	caa Gln	tac Tyr	gaa Glu 205	cgc Arg	aat Asn	gat Asp	gtg Val	ggc Gly 210	ttt Phe	act Thr	cgt Arg	739
	gct Ala 215															787
	gaa Glu															835
ttg Leu	tac Tyr	tac Tyr	atc Ile	cat His 250	ccc Pro	ctg Leu	act Thr	ggt Gly	gac Asp 255	acc Thr	atc Ile	cgg Arg	cag Gln	gtg Val 260	aat Asn	883
	atc Ile															931
	gaa Glu															979
	gat Asp 295															1027
	cgt Arg															1075
	ggc Gly															1123
	gca Ala															1171
	atc Ile															1219
	ggc Gly 375															1267
	cca Pro															1315
	cgc Arg															1363
gag Glu	atc Ile	gct Ala	gct Ala	gct Ala	gat Asp	ggt Gly	gag Glu	ttt Phe	gtg Val	gag Glu	cag Gln	gtc Val	att Ile	cgc Arg	cca Pro	1411

425 430 435 aca ggt ctg gtg gat cca aag gtc acc gtc aag cca acg aag ggg cag 1459 Thr Gly Leu Val Asp Pro Lys Val Thr Val Lys Pro Thr Lys Gly Gln 445 att gat gat ctg atc cat gaa att cgc caa cgc acc gat aaa gat gag 1507 Ile Asp Asp Leu Ile His Glu Ile Arg Gln Arg Thr Asp Lys Asp Glu 460 cgc gtt ttg gtc acc aca ttg acc aag aaa atg gct gag gat ctt act 1555 Arg Val Leu Val Thr Thr Leu Thr Lys Lys Met Ala Glu Asp Leu Thr 470 475 gat tac ctg ctg gaa aac ggc atc cgc gtg cgc tac ctg cac tca gat 1603 Asp Tyr Leu Leu Glu Asn Gly Ile Arg Val Arg Tyr Leu His Ser Asp 490 495 att gat acc ttg cag cgt gtg gaa ttg ctg cgt cag ctt cgc ctg ggc 1651 Ile Asp Thr Leu Gln Arg Val Glu Leu Leu Arg Gln Leu Arg Leu Gly 505 510 gaa tac gat gtg ttg gta ggt att aac ctg ctg cgt gag ggc ctt gac 1699 Glu Tyr Asp Val Leu Val Gly Ile Asn Leu Leu Arg Glu Gly Leu Asp 520 525 ctg cca gaa gtc tct ctg gtt gcg att ctc gac gcc gac aag gaa ggc 1747 Leu Pro Glu Val Ser Leu Val Ala Ile Leu Asp Ala Asp Lys Glu Gly 535 540 ttc ctg cgc tcc acc tca ctg att cag acc att ggc cgc gcc 1795 Phe Leu Arg Ser Thr Thr Ser Leu Ile Gln Thr Ile Gly Arg Ala Ala 550 555 565 cga aat gtg tcc ggc gag gtc atc atg tac gcc gac aag atc act gat Arg Asn Val Ser Gly Glu Val Ile Met Tyr Ala Asp Lys Ile Thr Asp 570 575 tcg atg cag tat gcc atc gag gaa acc gat cga cgc cgt gaa aag cag Ser Met Gln Tyr Ala Ile Glu Glu Thr Asp Arg Arg Glu Lys Gln 585 gtc gct tat aac aag gaa cac ggc atc gat ccg cag ccg ctt cga aag Val Ala Tyr Asn Lys Glu His Gly Ile Asp Pro Gln Pro Leu Arg Lys 600 605 aaa atc gcg gac atc ctc qac caq gtc tat gac aat tcc gct gat gga Lys Ile Ala Asp Ile Leu Asp Gln Val Tyr Asp Asn Ser Ala Asp Gly 615 620 gca gga cct tct gcc tct ggc gat gcg gca gtc gtg gct aaa cct gac 2035 Ala Gly Pro Ser Ala Ser Gly Asp Ala Ala Val Val Ala Lys Pro Asp 630 635 gtg tot ago atg coo goo aaa gaa gtg caa aag ott ato gao gao oto 2083 Val Ser Ser Met Pro Ala Lys Glu Val Gln Lys Leu Ile Asp Asp Leu 650 660 age get cag atg get geg gec geg egg gag etc aag tte gag etg gea 2131 Ser Ala Gln Met Ala Ala Ala Ala Arg Glu Leu Lys Phe Glu Leu Ala

2220

ggg cgt ctg cga gat gag atc ttc gag ctc aag aag gaa ctg aga ggt Gly Arg Leu Arg Asp Glu Ile Phe Glu Leu Lys Lys Glu Leu Arg Gly atc aag gat gcc ggc atc taagtcagct tgctcactta aag Ile Lys Asp Ala Gly Ile 695 <210> 104 <211> 699 <212> PRT <213> Corynebacterium glutamicum <400> 104 Met Ala Phe Ala Ala Glu His Pro Val Leu Ser His Ser Glu His Arg Pro Val Gly Glu Ile Glu Arg Ser Asp Asp Lys Phe Val Val Val Ser Glu Phe Glu Pro Ala Gly Asp Gln Pro Ala Ala Ile Lys Glu Leu Asp Glu Arg Leu Asp Arg Gly Glu Arg Asp Val Val Leu Met Gly Ala Thr Gly Thr Gly Lys Ser Ala Thr Ala Ala Trp Leu Ile Glu Lys Gln Gln Arg Pro Ala Leu Val Met Ala Pro Asn Lys Thr Leu Ala Ala Gln Leu Ala Asn Glu Leu Arg Gln Leu Leu Pro Asn Asn Ala Val Glu Tyr Phe 105 Val Ser Tyr Tyr Asp Tyr Tyr Gln Pro Glu Ala Tyr Ile Ala Gln Thr Asp Thr Tyr Ile Glu Lys Asp Ser Ser Ile Asn Glu Asp Val Glu Arg 135 Leu Arg His Ser Ala Thr Ser Ser Leu Leu Ser Arg Arg Asp Val Val 145 150 155 Val Val Ser Ser Val Ser Cys Ile Tyr Gly Leu Gly Thr Pro Gln Ser Tyr Leu Asp Arg Ser Val Val Leu Asn Val Gly Glu Glu Ile Asp Arg 180 Asp Arg Phe Leu Arg Leu Leu Val Asp Ile Gln Tyr Glu Arg Asn Asp Val Gly Phe Thr Arg Gly Ala Phe Arg Val Lys Gly Asp Thr Val Asp 210 Ile Ile Pro Ala Tyr Glu Glu Leu Ala Val Arg Ile Glu Phe Phe Gly 225 230 235 240

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BGI-127CP - 152 -565 570 575 Asp Lys Ile Thr Asp Ser Met Gln Tyr Ala Ile Glu Glu Thr Asp Arg 585 Arg Arg Glu Lys Gln Val Ala Tyr Asn Lys Glu His Gly Ile Asp Pro 600 Gln Pro Leu Arg Lys Lys Ile Ala Asp Ile Leu Asp Gln Val Tyr Asp

615

Asn Ser Ala Asp Gly Ala Gly Pro Ser Ala Ser Gly Asp Ala Ala Val 630

Val Ala Lys Pro Asp Val Ser Ser Met Pro Ala Lys Glu Val Gln Lys 650

Leu Ile Asp Asp Leu Ser Ala Gln Met Ala Ala Ala Arg Glu Leu 660 665

Lys Phe Glu Leu Ala Gly Arg Leu Arg Asp Glu Ile Phe Glu Leu Lys

Lys Glu Leu Arg Gly Ile Lys Asp Ala Gly Ile 690 695

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<222> (101)..(562)

<223> RXA00998

<400> 105

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gat caa ccc caa gat ctg ctt tcg ctt gca gaa ctt gcc gcc acc aga 163 Asp Gln Pro Gln Asp Leu Leu Ser Leu Ala Glu Leu Ala Ala Thr Arg 10

gct tta acc aca gac gaa ctt gaa gca ctc aac aac gcc aat tat ggc 211 Ala Leu Thr Thr Asp Glu Leu Glu Ala Leu Asn Asn Ala Asn Tyr Gly

ctc gac cgc aat ctg ggg ctg cgc tac acc acc atc gag ccc ggc cgg 259 Leu Asp Arg Asn Leu Gly Leu Arg Tyr Thr Thr Ile Glu Pro Gly Arg 40

gtg gtc agc gaa ctt cac gtg gca tcc aag cac ctg caa gtg gtg ggc 307 Val Val Ser Glu Leu His Val Ala Ser Lys His Leu Gln Val Val Gly 55

ttg gtc aac ggt ggt gtc tac gcc gcc atc gcc gaa tcc act gga tca 355

Leu 70	Val	Asn	Gly	Gly	Val 75	Tyr	Ala	Ala	Ile	Ala 80	Glu	Ser	Thr	Gly	Ser 85
gtc Val	gcc Ala	agc Ser	atg Met	att Ile 90	tcc Ser	gcc Ala	cct Pro	gga Gly	aaa Lys 95	atg Met	gtc Val	gtc Val	ggc Gly	atc Ile 100	aac Asn
	aac Asn														
	gca Ala														
	tgc Cys 135														
	gtg Val				tago	ccta	ata d	etego	ggcad	cc at	g				
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Met 1		Ser		5					10					15	
Met 1 Leu	Thr	Ser Ala	Thr 20	5 Arg	Ala	Leu	Thr	Thr 25	10 Asp	Glu	Leu	Glu	Ala 30	15 Leu	Asn
Met 1 Leu Asn	Thr	Ser Ala Asn 35	Thr 20 Tyr	5 Arg Gly	Ala Leu	Leu Asp	Thr Arg 40	Thr 25 Asn	10 Asp Leu	Glu Gly	Leu Leu	Glu Arg 45	Ala 30 Tyr	15 Leu Thr	Asn Thr
Met 1 Leu Asn	Thr Ala Ala Glu	Ser Ala Asn 35 Pro	Thr 20 Tyr Gly	5 Arg Gly Arg	Ala Leu Val	Leu Asp Val 55	Thr Arg 40 Ser	Thr 25 Asn Glu	10 Asp Leu Leu	Glu Gly His	Leu Leu Val 60	Glu Arg 45 Ala	Ala 30 Tyr Ser	15 Leu Thr Lys	Asn Thr His
Met 1 Leu Asn Ile Leu 65	Thr Ala Ala Glu 50	Ala Asn 35 Pro	Thr 20 Tyr Gly Val	5 Arg Gly Arg	Ala Leu Val Leu 70	Leu Asp Val 55 Val	Thr Arg 40 Ser Asn	Thr 25 Asn Glu Gly	10 Asp Leu Leu Gly	Glu Gly His Val 75	Leu Leu Val 60 Tyr	Glu Arg 45 Ala Ala	Ala 30 Tyr Ser	15 Leu Thr Lys Ile	Asn Thr His Ala 80
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Met 1 Leu Asn Ile Leu 65 Glu Val	Thr Ala Ala Glu 50 Gln Ser	Ala Asn 35 Pro Val Thr	Thr 20 Tyr Gly Val Gly Ile	5 Arg Gly Arg Gly Ser 85 Asn	Ala Leu Val Leu 70 Val Asn	Leu Asp Val 55 Val Ala	Thr Arg 40 Ser Asn Ser	Thr 25 Asn Glu Gly Met Asp 105	10 Asp Leu Leu Gly Ile 90 Phe	Glu Gly His Val 75 Ser	Leu Val 60 Tyr Ala	Glu Arg 45 Ala Ala Pro Ala	Ala 30 Tyr Ser Ala Gly Val 110	15 Leu Thr Lys Ile Lys 95 Ser	Asn Thr His Ala 80 Met
Met 1 Leu Asn Ile Leu 65 Glu Val Gly	Thr Ala Ala Glu 50 Gln Ser Val	Ala Asn 35 Pro Val Thr Gly Ile 115	Thr 20 Tyr Gly Val Gly Ile 100 Val	5 Arg Gly Arg Gly Ser 85 Asn Ala	Ala Leu Val Leu 70 Val Asn Glu	Leu Asp Val 55 Val Ala Asn	Thr Arg 40 Ser Asn Ser Thr	Thr 25 Asn Glu Gly Met Asp 105 Pro	10 Asp Leu Leu Gly Ile 90 Phe	Glu Gly His Val 75 Ser Ile	Leu Val 60 Tyr Ala Ser	Glu Arg 45 Ala Ala Pro Ala Gly 125	Ala 30 Tyr Ser Ala Gly Val 110 Gly	15 Leu Thr Lys Ile Lys 95 Ser Arg	Asn Thr His Ala 80 Met Ser

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gaa Glu	aac Asn	tat Tyr	caa Gln	aca Thr	Pro	gcg Ala	ccg Pro	agt Ser	tcg Ser 15	Gln	gtg Val	gtg Val	gtg Val	tct Ser 20	gtg Val	163
gtg Val	GJ À aaa	cac His	gtg Val 25	Ата	aaa Lys	ccc Pro	ggc Gly	ctg Leu 30	gtc Val	acg Thr	ctc Leu	gct Ala	gag Glu 35	ggc	tcg Ser	211
cgg Arg	gtg Val	gct Ala 40	gat Asp	gcc Ala	ctg Leu	gcc Ala	att Ile 45	gca Ala	ggt Gly	gcc Ala	ttg Leu	cca Pro 50	gac Asp	gcc Ala	gat Asp	259
ctg Leu	acg Thr 55	gcg Ala	ctc Leu	aac Asn	ttg Leu	gcg Ala 60	caa Gln	ttg Leu	ctt Leu	gtc Val	gac Asp 65	ggc Gly	acc Thr	cag Gln	atc Ile	307
cat His 70	gtt Val	tta Leu	gct Ala	atc Ile	ggc Gly 75	gag Glu	gta Val	caa Gln	cct Pro	att Ile 80	tcg Ser	gtt Val	gat Asp	gct Ala	gct Ala 85	355
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gat Asp	ttg Leu	gtg Val	acg Thr 105	ctg Leu	cct Pro	ggg Gly	gtg Val	ggg Gly 110	gag Glu	aag Lys	aca Thr	gcg Ala	cag Gln 115	gcg Ala	atc Ile	451
att Ile	gac Asp	ttt Phe 120	cgg Arg	gag Glu	agc Ser	aac Asn	ggt Gly 125	ggg Gly	ttt Phe	agc Ser	acc Thr	gtg Val 130	gag Glu	gat Asp	tta Leu	499
ctg Leu	cag Gln 135	gtc Val	aag Lys	ggg Gly	att Ile	ggg Gly 140	ccc Pro	tca Ser	aag Lys	ttt Phe	gag Glu 145	cag Gln	atc Ile	tct Ser	gga Gly	547
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<213> Corynebacterium glutamicum

<400> 108

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Leu Ala Glu Gly Ser Arg Val Ala Asp Ala Leu Ala Ile Ala Gly Ala 35 40 45

Leu Pro Asp Ala Asp Leu Thr Ala Leu Asn Leu Ala Gln Leu Leu Val 50 55 60

Asp Gly Thr Gln Ile His Val Leu Ala Ile Gly Glu Val Gln Pro Ile 65 70 75 80

Ser Val Asp Ala Ala Thr Ser Ala Ser Gly Leu Ile Ser Leu Asn 85 90 95

Thr Ala Thr Val Ala Asp Leu Val Thr Leu Pro Gly Val Gly Glu Lys

Thr Ala Gln Ala Ile Ile Asp Phe Arg Glu Ser Asn Gly Gly Phe Ser 115 120 125

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Glu Gln Ile Ser Gly Leu Val Ser Pro 145 150

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Glu Ser Ser Arg Gly Leu Ile Pro Gly Met Val Leu Gly Asp Thr Arg 185

Leu Gln Gly Ser Ile Glu Ala Gln Thr Tyr Ile Asp Thr Gly Leu Ser 200

His Leu Ser Ala Val Ser Gly Ser Asn Val Ala Ile Val Val Ser Ser 215

Val Val Val Leu Ser Tyr Phe Leu Thr Ala Gly Pro Arg Ile Arg Val

Val Ala Ser Leu Leu Ser Leu Val Ile Phe Val Ser Leu Val Gly Phe 250

Glu Pro Ser Val Leu Arg Ala Ser Val Thr Gly Ile Val Gly Leu Leu 265

Ala Ile Ile Asn Ser Ser Arg Met Glu Pro Met His Gly Leu Ser Leu 280

Ser Val Ile Cys Leu Leu Phe Tyr Asp Ser Asn Leu Ala Val His Tyr

Gly Phe Leu Leu Ser Cys Ala Ala Thr Ala Gly Ile Val Met Leu Gln 315

Pro Leu Leu Tyr Arg Ala Ile Gly Pro Pro Leu Ala Val Trp Lys Val

Pro Asp Ile Val Val Arg Ala Phe Ala Val Ser Ile Ala Ala Asp Leu 345

Val Thr Ile Pro Ile Ile Ala Leu Met Ala Arg Gln Ile Ser Leu Val

Ala Val Leu Ala Asn Val Leu Val Glu Leu Ala Val Pro Pro Ile Thr

Leu Leu Gly Leu Ile Ala Val Leu Ala Ser Leu Leu Pro Trp Pro Val

Glu Tyr Pro Leu Leu Lys Ile Ile Glu Pro Phe Thr Trp Trp Ile His 410

His Val Ala Lys Trp Cys Gln Gln Leu Pro Asn Ser Thr Leu Glu Ile

Ser Ala Gly Trp Ala Gly Ile Ala Trp Ala Cys Met Ala Ala Val Trp

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Ser Val Ile Cys Leu Leu Phe Tyr Asp Ser Asn Leu Ala Val His Tyr

96

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869

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D9602839.os2300

gga	a cac	cct	: qta	a cto	c att	att	gat	. dad	r naa	a	a aat			2 2 2	ctc	505
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ggc Gly	aac Asn 375	tcg Ser	ctt Leu	ggg Gly	Arg	ggt Gly 380	tta Leu	aca Thr	ttc Phe	aac Asn	aac Asn 385	ttg Leu	caa Gln	acc Thr	gtt Val	1267
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Ph:	e Ty:	r Va.	l Arç	g Glu	Ser 395	Lys	s Arg	, Pro	Glr	n Ala) Thr	Leu	Trp	Gln 405	
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gcc Ala	gct Ala	gat Asp	cct Pro	aga Arg 490	atc Ile	aag Lys	aat Asn	gtc Val	gaa Glu 495	gca Ala	ctc Leu	gac Asp	aaa Lys	aaa Lys 500	ctc Leu	1603
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gca Ala	gaa Glu	gtc Val	gca Ala 585	cac His	cca Pro	tta Leu	Leu	atc Ile 590	cta Leu	tac Tyr	cgc Arg	att Ile	gaa Glu 595	ggt Gly	gtt Val	1891
aac Asn	gat Asp	gct Ala 600	gct Ala	gcg Ala	caa Gln	cga Arg	ggt Gly 605	gaa Glu	cct Pro	acg Thr	tgg Trp	tca Ser 610	agc Ser	gac Asp	cct Pro	1939
atc Ile	tgg Trp 615	gtg Val	cct Pro	aat Asn	Ile	aaa Lys 620	ctc Leu	cct Pro	ggt Gly	Gln	cgt Arg 625	caa Gln	ttc Phe	tgg Trp	tgc Cys	1987
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<210> 118

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<212> PRT

<213> Corynebacterium glutamicum

<400> 118

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His Thr Val Met Asp Asp Phe Asp Tyr Ile Ser Asp Gln Gln Val Leu 35 40 45

Leu Tyr Gly Asp Val Gln Ser Gly Lys Thr Ser His Met Leu Gly Ile 50 60

Ile Ala Asp Cys Leu Asp Ser Thr Phe His Thr Ile Val Ile Leu Thr 65 70 75 80

Ser Pro Asn Thr Arg Leu Val Gln Gln Thr Tyr Asp Arg Val Ala Gln 85 90 95

Ala Phe Pro Asp Thr Leu Val Cys Asp Arg Asp Gly Tyr Asn Asp Phe 100 100 110

Arg Ala Asn Gln Lys Ser Leu Thr Pro Arg Lys Ser Ile Val Val Val 115

Gly Lys Ile Pro Ala Val Leu Gly Asn Trp Leu Arg Val Phe Asn Asp 130 135 140

Ser Gly Ala Leu Ser Gly His Pro Val Leu Ile Ile Asp Asp Glu Ala 145 150 155 160

Asp Ala Thr Ser Leu Asn Thr Lys Val Asn Gln Ser Asp Val Ser Thr 165 170 175

Ile Asn His Gln Leu Thr Ser Ile Arg Asp Leu Ala Thr Gly Cys Ile 180 185 190

Tyr Leu Gln Val Thr Gly Thr Pro Gln Ala Val Leu Leu Gln Ser Asp 195 200 205

Asp Ser Asn Trp Ala Ala Glu His Val Leu His Phe Ala Pro Gly Glu 210 215 220

Ser Tyr Ile Gly Gly Gln Leu Phe Phe Ser Glu Leu Asn Asn Pro Tyr 225 230 235 240

Leu Arg Leu Phe Ala Asn Thr Gln Phe Asp Glu Asp Ser Arg Phe Ser 245 255

Asp Ala Ile Tyr Thr Tyr Leu Leu Thr Ala Ala Leu Phe Lys Leu Arg 260 265 270

Gly Glu Ser Leu Cys Thr Met Leu Ile His Pro Ser His Thr Ala Ser

275 280 285 Ser His Arg Asp Phe Ala Gln Glu Ala Arg Leu Gln Leu Thr Phe Ala 295 300 Phe Glu Arg Phe Tyr Glu Pro Met Ile Gln His Asn Phe Gln Arg Ala 315 Tyr Glu Gln Leu Ala Gln Thr Asp Ser Asn Leu Pro Pro Leu Arg Lys 330 Ile Leu Asn Ile Leu Gly Gly Met Glu Asp Asp Phe Ser Ile His Ile Val Asn Ser Asp Asn Pro Thr Val Glu Glu Asp Trp Ala Asp Gly Tyr 360 Asn Ile Ile Val Gly Gly Asn Ser Leu Gly Arg Gly Leu Thr Phe Asn 375 Asn Leu Gln Thr Val Phe Tyr Val Arg Glu Ser Lys Arg Pro Gln Ala 390 Asp Thr Leu Trp Gln His Ala Arg Met Phe Gly Tyr Lys Arg His Lys 405 Asp Thr Met Arg Val Phe Met Pro Ala Thr Ile Ala Gln Thr Phe Gln 425 Glu Val Tyr Leu Gly Asn Glu Ala Ile Lys Asn Gln Leu Asp His Gly Thr His Ile Asn Asp Ile Arg Val Ile Leu Gly Asp Gly Val Ala Pro 455 Thr Arg Ala Asn Val Leu Asp Lys Arg Lys Val Gly Asn Leu Ser Gly Gly Val Asn Tyr Phe Ala Ala Asp Pro Arg Ile Lys Asn Val Glu Ala 490 Leu Asp Lys Lys Leu Leu Ala Tyr Leu Asp Lys His Gly Glu Asp Ser 505 Thr Ile Gly Met Arg Ala Ile Ile Thr Ile Leu Asn Ala Phe Thr Val 520 Asp Pro Asn Asp Leu Asp Leu Ala Thr Phe Lys Ala Ala Leu Leu Asp Phe Glu Arg Asn Gln Pro His Leu Thr Ala Arg Met Val Leu Arg Thr 550 Asn Arg Lys Val Asn Gln Gly Thr Gly Ala Leu Leu Ser Pro Thr Asp 565 Gln Ala Leu Ser Arg Ala Glu Val Ala His Pro Leu Leu Ile Leu Tyr Arg Ile Glu Gly Val Asn Asp Ala Ala Ala Gln Arg Gly Glu Pro Thr 600

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			tc tac ccc ggc ctg gtg 16 le Tyr Pro Gly Leu Val 20	53
			ag ccg ttc cac acg gtc 21 ys Pro Phe His Thr Val 35	L1
			tg ctg acc tat acg cac 25 Met Leu Thr Tyr Thr His 50	59
		Tyr Ile Asp P	ccg ccg tac aac acc ggg 30 Pro Pro Tyr Asn Thr Gly 65 •	07
	_	Asn Asp Tyr V	tc gcg agt gat gac gac 35 Val Ala Ser Asp Asp Asp 80 85	55
-			gag cga cgg ttg aag atc 40 Glu Arg Arg Leu Lys Ile 100	03
		-	ett gtg gca cct atc gat 45 Leu Val Ala Pro Ile Asp 115	51
			cta gat cag ctc ttc ccg 49 Leu Asp Gln Leu Phe Pro 130	99
	_	. Thr Ile Val A	aac aac cct aaa ggc gtt 54 Asn Asn Pro Lys Gly Val 145	47

						•										,	
ac Th 15		ag ln	gga Gly	tai Tyi	t cti r Lei	tco Ser 155	Arg	g gto Val	gaa Glu	a gaç ı Glı	y ta: 1 Ty: 160	r Ala	y tto Ph∈	tt Phe	t gt. e Va.	a ttt l Phe 165	595
gg G1	jt co .y P:	ct	gac Asp	gco	g cga Arg 170	тте	ggt Gly	tcg Ser	gto Val	gat Asp 175	Asp	gac Asp	ctt Leu	cto Lev	g aco	g cat His	643
cg Ar	a ga g As	ac sp	atg Met	gcc Ala 185	ASP	gct Ala	gaa Glu	Gly	gaa Glu 190	Leu	caç Glr	ı agg ı Arg	cct Pro	cga Arg 195	, Trp	g aag D Lys	691
gg Gl	g ct y L∈		ttg Leu 200	cgg Arg	tcg Ser	ggc	gac Asp	gac Asp 205	tcg Ser	ctt Leu	cga Arg	gct Ala	gac Asp 210	cgt Arg	aaa Lys	gat Asp	739
at Me	g tt t Ph 21		tat Tyr	ccg Pro	gtg Val	tgg Trp	ttc Phe 220	gat Asp	gag Glu	tcg Ser	act Thr	ggg Gly 225	cga Arg	ctc Leu	ago Ser	cac	787
gc: Ala 23(, O.	у (gaa Glu	gca Ala	ttg Leu	cca Pro 235	ctt Leu	gac Asp	gaa Glu	act Thr	cct Pro 240	gac Asp	ttc Phe	agt Ser	ccg Pro	cag Gln 245	835
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Pro	Phe	H	is T 35	hr	Val '	Val A	Asn A	Ala (Glu Z	Asn '	Tyr	His .	Ala :	Leu	Glu	Met	
Leu	Thr 50	Ty	yr T	hr I	His A	Arg H	His S 55	Ser I	Ile A	Asp A	Ala	Ile 1	ſyr :	Ile	Asp	Pro	
Pro 65	Tyr	As	sn T	hr (Gly A	Ala <i>F</i> 70	Arg A	lsp T	[rp]	Lys I	Гуг 7 75	Asp A	Asn i	Asp	Tyr	Val 80	
Ala	Ser	As	sp A	sp A	Asp 1 85	Tyr A	arg H	lis S	Ser I	Lys 7 90	[rp]	Leu A	Ala N	Phe 1	Met 95	Glu	

Arg Arg Leu Lys Ile Cys Arg Glu Leu Met Arg Ser Asp Ala Thr Leu 105 110 Val Ala Pro Ile Asp Glu His Glu Val Asn Arg Leu Gly Val Leu Leu 120 Asp Gln Leu Phe Pro Glu Ser Thr Arg Gln Leu Val Thr Ile Val Asn 135 Asn Pro Lys Gly Val Thr Gln Gly Tyr Leu Ser Arg Val Glu Glu Tyr 150 155 Ala Phe Phe Val Phe Gly Pro Asp Ala Arg Ile Gly Ser Val Asp Asp Asp Leu Leu Thr His Arg Asp Met Ala Asp Ala Glu Gly Glu Leu Gln 180 Arg Pro Arg Trp Lys Gly Leu Leu Arg Ser Gly Asp Asp Ser Leu Arg 205 Ala Asp Arg Lys Asp Met Phe Tyr Pro Val Trp Phe Asp Glu Ser Thr Gly Arg Leu Ser His Ala Gly Glu Ala Leu Pro Leu Asp Glu Thr Pro 230 235 Asp Phe Ser Pro Gln Asp Gly Leu Thr Pro Ile Trp Pro Ile Arg Arg 245 Asp Met Lys Glu Gly Pro Thr Arg Ala Ala Pro Arg Arg Ser Ile Leu Asp Tyr Ala Leu His Pro His Leu 275 <210> 121 <211> 441 <212> DNA <213> Corynebacterium glutamicum <220> <221> CDS <222> (101)..(418) <223> RXA02236 <400> 121 gcaggctgac atccttggta ttaaccaggt gtaccctcga tttctggata ctttggtatt 60 ccttttgtca ctaaaaacca cacgataacg gaggaacccc gtg gcc ctt cca cag Val Ala Leu Pro Gln 1 ttg act gat gag cag cgc aag gca gcg ctt gct aag gca gca gag gca 163 Leu Thr Asp Glu Gln Arg Lys Ala Ala Leu Ala Lys Ala Ala Glu Ala 10 cgc aag gca cgc gca gag ctc aaa gag aac ctg aag cgc ggc aac act 211 Arg Lys Ala Arg Ala Glu Leu Lys Glu Asn Leu Lys Arg Gly Asn Thr 25 3.5

aac ctc agg gaa gtt ctg gac aag gct gag tct gac gag atc atc ggc Asn Leu Arg Glu Val Leu Asp Lys Ala Glu Ser Asp Glu Ile Ile Gly 40 45 50	259
aag acc aag gtc tcc gct ctc ctc gag gct ctc cct aag gtt ggc aag Lys Thr Lys Val Ser Ala Leu Leu Glu Ala Leu Pro Lys Val Gly Lys 55 60 65	307
gtc aag gca aag gag att atg gac gag ctg ggc att gct cag acc cgt Val Lys Ala Lys Glu Ile Met Asp Glu Leu Gly Ile Ala Gln Thr Arg 70 75 80 85	355
cgt ctt cgt gga ctg ggt gac cgt cag cgt cgc gca ctt ctc gag cgt Arg Leu Arg Gly Leu Gly Asp Arg Gln Arg Arg Ala Leu Leu Glu Arg 90 95 100	403
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Lys Arg Gly Asn Thr Asn Leu Arg Glu Val Leu Asp Lys Ala Glu Ser 35

Asp Glu Ile Ile Gly Lys Thr Lys Val Ser Ala Leu Leu Glu Ala Leu

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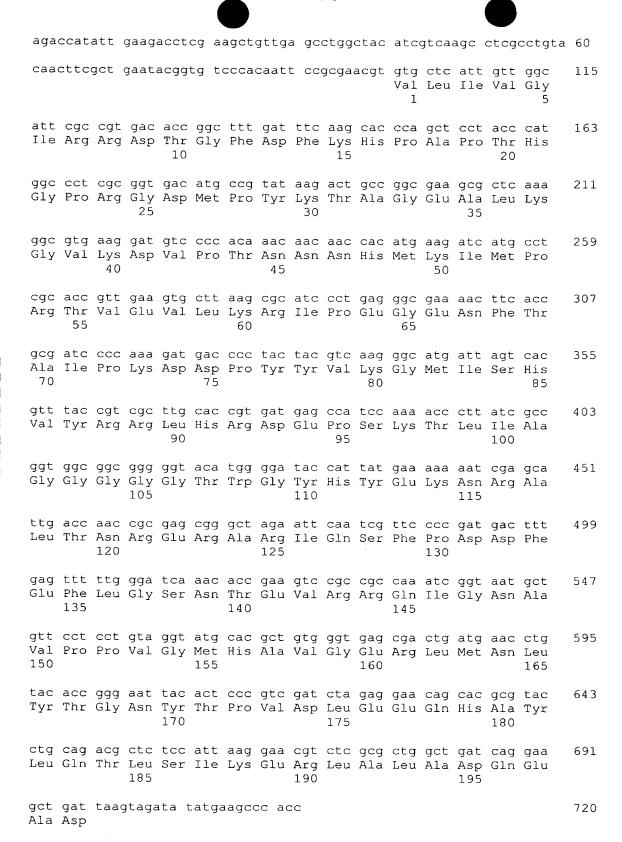
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Gly Glu Ala Leu Lys Gly Val Lys Asp Val Pro Thr Asn Asn Asn His 35 40 45

Met Lys Ile Met Pro Arg Thr Val Glu Val Leu Lys Arg Ile Pro Glu 50 55 60

Gly Glu Asn Phe Thr Ala Ile Pro Lys Asp Asp Pro Tyr Tyr Val Lys 65 70 75 80

Gly Met Ile Ser His Val Tyr Arg Arg Leu His Arg Asp Glu Pro Ser 85 90 95

Lys Thr Leu Ile Ala Gly Gly Gly Gly Gly Thr Trp Gly Tyr His Tyr
100 105 110

Glu Lys Asn Arg Ala Leu Thr Asn Arg Glu Arg Ala Arg Ile Gln Ser 115 120 125

Phe Pro Asp Asp Phe Glu Phe Leu Gly Ser Asn Thr Glu Val Arg Arg 130 135 140

Gln Ile Gly Asn Ala Val Pro Pro Val Gly Met His Ala Val Gly Glu 145 150 155 160

Arg Leu Met Asn Leu Tyr Thr Gly Asn Tyr Thr Pro Val Asp Leu Glu 165 170 175

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Val Gln Lys Trp Gly

1 5

tta	a ago	s tta	c ata	י משני	7 200		. ~+.								,	
Lei	ı Se	r Phe	e Val	l Glu 10	ı Arç	, acc	· ycc · Val	l Ile	: gtq : Val	Asr	aac n Asn	gto Val	g caa . Glr	a cad n Gli 20	g ttt n Phe)	163
cat His	cga Arq	a ttt g Phe	ttt Phe 25	Asp	gat Asp	tcc Ser	gca Ala	gto Val 30	Tyr	tat Tyr	ccc Pro	tgc Cys	tto Phe	· Val	ccg Pro	211
ctt Leu	gad Asp	c cga Arg 40	ATA	ato Ile	ggc Gly	gaa Glu	cac His	Phe	gat Asp	cgt Arg	cag Gln	aac Asn 50	Lys	cco	g atg Met	259
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acc Thr	aac Asn	acc Thr 120	gct Ala	tgg Trp	ttg Leu	gga Gly	gat Asp 125	gtg Val	gaa Glu	aaa Lys	ctc Leu	atc Ile 130	caa Gln	caa Gln	cat His	499
cgc Arg	aac Asn 135	act Thr	ttc Phe	gta Val	tgg Trp	gtt Val 140	gag Glu	att Ile	ccg Pro	aca Thr	gcc Ala 145	ctg Leu	gtc Val	acc Thr	gca Ala	547
gat Asp 150	att Ile	gtc Val	cga Arg	aaa Lys	ctc Leu 155	cgc Arg	cac His	atg Met	gga Gly	gct Ala 160	ggc Gly	ctg Leu	aaa Lys	tac Tyr	aga Arg 165	595
act Thr	gga Gly	ggt Gly	gat Asp	agg Arg 170	gaa Glu	gag Glu	ctc Leu	ttc Phe	ccc Pro 175	tca Ser	ccg Pro	cag Gln	gac Asp	ttg Leu 180	gtc Val	643
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ctt Leu	cac His 215	ttc Phe	gga Gly	ttc Phe	Leu .	aac Asn 220	att Ile	gca Ala	gcc Ala	gcc Ala	gtg Val 225	gcg Ala	aca Thr	ctt Leu	cgt Arg	787
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gcc	gct	ccg	ctt	att	cac	gca	cta	caa	agc	ggc	gaa	aac	tgg	cgg	gat	883

973

996

Alá	a Ala	a Pro) Lei	1 Ile 250	His	: Alā	a Leu	ı Glr	Ser 255		Glu	Asn	Trp	Arg 260	Asp
tco Ser	ttc Phe	cgc Arg	ago Ser 265	Phe	: agt : Ser	acc Thr	tgc Cys	aat Asn 270	Val	gtt Val	gaa Glu	cca Pro	ctc Leu 275	aac Asn	act Thr
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1	OIII	цуз	110	5	ьеи	ser	Phe	val	10	Arg	IIe	Val	lle	Val 15	Asn
Asn	Val	Gln	Gln 20	Phe	His	Arg	Phe	Phe 25	Asp	Asp	Ser	Ala	Val 30	Tyr	Tyr
Pro	Cys	Phe 35	Val	Pro	Leu	Asp	Arg 40	Ala	Ile	Gly	Glu	His 45	Phe	Asp	Arg
Gln	Asn 50	Lys	Pro	Met	Ser	Arg 55	Phe	Ile	Gly	Thr	Leu 60	Ile	Leu	Pro	Leu
Ala 65	Lys	Leu	Glu	Glu	Ala 70	Ala	Gln	Tyr	Thr	Gly 75	Asp	Glu	Val	Leu	Arg 80
Val	Ser	Ala	Val	Ile 85	Ser	Thr	Asp	Gly	Leu 90	Ala	Asp	Leu	Arg	Arg 95	Asp
Phe	Tyr	Glu	Leu 100	Pro	Asn	Ile	Asp	Ile 105	Ala	Ser	Val	Glu	Ile 110	Lys	Leu
Val	Gly	Ala 115	Ala	Leu	Thr	Asn	Thr 120	Ala	Trp	Leu	Gly	Asp 125	Val	Glu	Lys
Leu	Ile 130	Gln	Gln	His	Arg	Asn 135	Thr	Phe	Val	Trp	Val 140	Glu	Ile	Pro	Thr
Ala 145	Leu	Val	Thr	Ala	Asp 150	Ile	Val	Arg	Lys	Leu 155	Arg	His	Met	Gly	Ala 160
Gly	Leu	Lys	Tyr	Arg 165	Thr	Gly	Gly	Asp	Arg 170	Glu	Glu	Leu	Phe	Pro 175	Ser
Pro	Gln	Asp	Leu 180	Val	Thr	Val	Leu	Arg 185	Thr	Ala	Ile	Asp	Ala 190	Ala	Leu
Pro	Phe	Lys 195	Leu	Thr	Ala	Gly	Leu 200	His	Arg	Ala	Leu	Arg 205	Tyr	Arg	Asp
Glu	Lys 210	Thr	Gly	Arg	Leu	His 215	Phe	Gly	Phe	Leu	Asn 220	Ile	Ala	Ala	Ala

Val Ala Thr Leu Arg Ala Gly Lys Gly Glu Ala Glu Ala Leu Lys Ile 235 Leu Glu Gly Asp Asp Ala Ala Pro Leu Ile His Ala Leu Gln Ser Gly 245 Glu Asn Trp Arg Asp Ser Phe Arg Ser Phe Ser Thr Cys Asn Val Val 265 Glu Pro Leu Asn Thr Leu Ile Asp Leu Asp Val Leu Ala Glu Gly Asp 280 Val His Pro 290 <210> 127 <211> 729 <212> DNA <213> Corynebacterium glutamicum <220> <221> CDS <222> (101)..(706) <223> RXN02988 <400> 127 agcggcaaat atgtgcggct tggcataaac tgtgtccatc ggtacctgtg taatagacac 60 acggtaaaca cgcacaagat aaaacattgc gagatttttc atg agt aca aaa ccc Met Ser Thr Lys Pro 1 act att gtg tcc aca ttt tct ggt tgc ggt ggc ctc gat ctt ggc ctc 163 Thr Ile Val Ser Thr Phe Ser Gly Cys Gly Gly Leu Asp Leu Gly Leu 10 caa gag gtc gga ttc gac ccc att tgg gcc aac gac ttc tca gaa gaa 211 Gln Glu Val Gly Phe Asp Pro Ile Trp Ala Asn Asp Phe Ser Glu Glu 30 gea gte caa ace tat aag cae aac ate ggt gae cae att gtt cae gge 259 Ala Val Gln Thr Tyr Lys His Asn Ile Gly Asp His Ile Val His Gly 40 45 50 gac atc act gaa att gat ccg ttt act gat gac acc atc cct gac ggc 307 Asp Ile Thr Glu Ile Asp Pro Phe Thr Asp Asp Thr Ile Pro Asp Gly 55 60 gat etc gtc acc ggc ggc ttc ecg tgc eag gac ttc tcc atg atc tgg Asp Leu Val Thr Gly Gly Phe Pro Cys Gln Asp Phe Ser Met Ile Trp 70 75 80 aag cgt cct gga ctc gac ggc aag cgt ggc acc ctg tac caa aac ttc Lys Arg Pro Gly Leu Asp Gly Lys Arg Gly Thr Leu Tyr Gln Asn Phe 90 cgt gac ttt gtt gca gca aag cct aaa gcc ttt atc gca gaa aac 451 Arg Asp Phe Val Ala Ala Lys Lys Pro Lys Ala Phe Ile Ala Glu Asn 105

.

	_	ggc Gly 120				_		_		_	-		_			499
		acc Thr														547
_		act Thr	_	_			_									595
	_	ttg Leu	_		_			-	-	_			_			643
		ccc Pro														691
_	_	tca Ser 200	_		tgaa	aggat	gt d	ccca	acaaa	ac aa	ac					729
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Met 1	Ser			5					10					15		
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Met 1 Leu Asp	Ser Asp Phe	Thr Leu Ser	Gly 20 Glu	5 Leu Glu	Gln Ala Asp	Glu Val	Val Gln 40 Thr	Gly 25 Thr	10 Phe Tyr	Asp Lys	Pro His	Ile Asn 45 Phe	Trp 30 Ile	15 Ala Gly	Asn Asp	
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Met 1 Leu Asp His Thr 65	Asp Phe Ile 50	Thr Leu Ser 35 Val	Gly 20 Glu His	5 Leu Glu Gly	Gln Ala Asp Asp 70	Glu Val Ile 55 Leu	Val Gln 40 Thr	Gly 25 Thr Glu	10 Phe Tyr Ile Gly	Asp Asp Gly 75	Pro His Pro 60 Phe	Ile Asn 45 Phe	Trp 30 Ile Thr	15 Ala Gly Asp	Asp Asp Asp 80	
Met 1 Leu Asp His Thr 65 Phe	Ser Asp Phe Ile 50 Ile Ser	Thr Leu Ser 35 Val	Gly 20 Glu His	5 Leu Glu Gly Gly Trp 85	Gln Ala Asp Asp 70 Lys	Glu Val Ile 55 Leu Arg	Val Gln 40 Thr Val	Gly 25 Thr Glu Thr	10 Phe Tyr Ile Gly Leu 90	Asp Asp Gly 75 Asp	Pro His Pro 60 Phe	Ile Asn 45 Phe Pro	Trp 30 Ile Thr Cys	15 Ala Gly Asp Gln Gly 95	Asn Asp Asp Asp Thr	
Met 1 Leu Asp His Thr 65 Phe	Ser Asp Phe Ile 50 Ile Ser Tyr	Thr Leu Ser 35 Val Pro Met	Gly 20 Glu His Asp Ile Asn 100	5 Leu Glu Gly Gly Trp 85 Phe	Gln Ala Asp 70 Lys Arg	Glu Val Ile 55 Leu Arg	Val Gln 40 Thr Val Pro	Gly 25 Thr Glu Thr Gly Val 105	10 Phe Tyr Ile Gly Leu 90 Ala	Asp Asp Gly 75 Asp	Pro His Pro 60 Phe Gly Lys	Ile Asn 45 Phe Pro Lys	Trp 30 Ile Thr Cys Arg Pro 110	Ala Gly Asp Gln Gly 95 Lys	Asn Asp Asp Asp Thr	
Met 1 Leu Asp His Thr 65 Phe Leu	Asp Phe Ile 50 Ile Ser Tyr	Thr Leu Ser 35 Val Pro Met Gln Ala 115	Gly 20 Glu His Asp Ile Asn 100 Glu	5 Leu Glu Gly Gly Trp 85 Phe Asn	Gln Ala Asp 70 Lys Arg Val	Glu Val Ile 55 Leu Arg Asp	Val Gln 40 Thr Val Pro Phe Gly 120	Gly 25 Thr Glu Thr Gly Val 105 Leu	10 Phe Tyr Ile Gly Leu 90 Ala Leu	Asp Lys Asp Gly 75 Asp Ala	Pro His Pro 60 Phe Gly Lys Ala	Ile Asn 45 Phe Pro Lys Lys Asn 125	Trp 30 Ile Thr Cys Arg Pro 110 Gln	Ala Gly Asp Gln Gly 95 Lys	Asp Asp Asp 80 Thr	

Ser Ala Asn Val Cys Ser Leu Leu Ala Phe Ala Val Thr Pro Ala Leu 165 170 175

Ile Ser Ser Thr Gln Leu Leu Pro Met Ala Leu Ala Val Thr Cys Arg 180 185 190

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				Val	Trp	Thr	Leu	Ser	
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ccg	tat	gac	ggc	ccg	cat	cgc	aac	gtg	ctc	att	gcg	ctq	aaq	gag	cac	163
Pro	Tyr	Asp	Gly	Pro	His	Arg	Asn	Val	Leu	Ile	Ālā	Leú	Lvs	Glu	His	
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ggc	cgt	gca	gac	ctt	gtg	gcg	ttt	gtg	ggc	gcg	gtg	gtg	ggg	gcg	tcg	211
Gly	Arg	Ala	Asp	Leu	Val	Ala	Phe	Val	Gly	Ala	Val	Val	Gly	Ala	Ser	
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Ile	Ser	Tyr	Leu	Ala	Āla	Gln	Glv	Ğlu	Ile	Ğlü	His	Asp	Tle	Thr	Len	200
		40					45					50			200	

gtt	ccg	gcg	CCC	acc	cgc	gcc	acc	tcg	cga	cqc	caa	caa	aac	aac	gat	307
Val	Pro	Ala	Pro	Thr	Arg	Ala	Thr	Ser	Ara	Ara	Ara	Ara	Glv	Glv	Asp	
	55					60			,		65	5	1	O ± 1	1100	

ccg	gtt	gag	cgg	gtg	tgc	aat	qca	tca	cac	tta	tca	aca	titit	ccc	tac	355
Pro	Val	Glu	Arg	Val	Cys	Asn	Ála	Ser	Ara	Leu	Ser	Thr	Phe	Pro	Cvs	500
70					75				5	80	001		2110	110	05	

ctt	caa	atc	tca	tcc	cgc	aca	cca	gac	tcc	atc	aat	caa	act	aca	caa	403
Leu	Gln	Ile	Ser	Ser	Arg	Thr	Pro	Asp	Ser	Val	Glv	Gln	Thr	Ala	Gln	
				90	-			-	95					100	0211	

Gln Arg Arg Leu Asn Met Arg Val Glu Leu Val Arg Gln Pro Arg Gly 105 110 115	cag Gln	cga Arg	aga Arg	Leu	Asn	atg Met	cga Arg	Val	Glu	tta Leu	gtc Val	cga Arg	Gln	Pro	cgg Arg	ggt Gly	45	1
---	------------	------------	------------	-----	-----	------------	------------	-----	-----	------------	------------	------------	-----	-----	------------	------------	----	---

tct Ser	gtc Val	Leu	Ile	atc Ile	gac Asp	gat Asp	gtg Val	gta Val	aca Thr	acg Thr	ggg Gly	gca Ala	act Thr	att Ile	tcc Ser	499
		120					125					130				

gca tct gca aac gtt ctt cgc gca gcg ggt gtg cag gtc aga gga gct 547

Ala Ser Ala Asn Val Leu Arg Ala Ala Gly Val Gln Val Arg Gly Ala tta act tat tgc caa gcg tgatcttgga tataaaaggg gcc 588 Leu Thr Tyr Cys Gln Ala 155 <210> 130 <211> 155 <212> PRT <213> Corynebacterium glutamicum <400> 130 Val Trp Thr Leu Ser Pro Tyr Asp Gly Pro His Arg Asn Val Leu Ile Ala Leu Lys Glu His Gly Arg Ala Asp Leu Val Ala Phe Val Gly Ala Val Val Gly Ala Ser Ile Ser Tyr Leu Ala Ala Gln Gly Glu Ile Glu His Asp Ile Thr Leu Val Pro Ala Pro Thr Arg Ala Thr Ser Arg Arg 55 Arg Arg Gly Gly Asp Pro Val Glu Arg Val Cys Asn Ala Ser Arg Leu Ser Thr Phe Pro Cys Leu Gln Ile Ser Ser Arg Thr Pro Asp Ser Val Gly Gln Thr Ala Gln Gln Arg Arg Leu Asn Met Arg Val Glu Leu Val 105 Arg Gln Pro Arg Gly Ser Val Leu Ile Ile Asp Asp Val Val Thr Thr 115 120 Gly Ala Thr Ile Ser Ala Ser Ala Asn Val Leu Arg Ala Ala Gly Val Gln Val Arg Gly Ala Leu Thr Tyr Cys Gln Ala 145 <210> 131 <211> 864 <212> DNA <213> Corynebacterium glutamicum <220> <221> CDS <222> (101)..(841) <223> RXN02938 <400> 131 accategtgg tttetecaga eggeaatgta gtggacaeet teeegeagee tttegaaaee 60 atcgatgacc tcgaaaccgc tgtggcaggg gcgctgcaga atg cgt aac tac cct 115

Met Arg Asn Tyr Pro

gat Asp	tta Leu	Pro	g ca D His	t ga s As _i	b bue	c cca e Pro	aggi oGly	t caa y Gli	a aad n Asi 15	n Thi	a gad r Gli	g cto u Leo	c ac	c cc r Pr 2	c gca o Ala O	163
aag Lys	gca Ala	ccc Pro	gto Val	r III	g ato D Met	g cac His	c cga s Arc	a cto g Leu 30	ı Lei	a gad ı Asp	c cgo Aro	c ato	cac His	5 Th	c ggc r Gly	211
cgc Arg	atg Met	gcc Ala 40	- ASI	c ccq n Pro	g cto Lev	g gac 1 Asp	ggt Gly 45	/ Ala	g gaa Glu	a acç ı Thr	g cto Leu	ggc Gly 50	/ Asp	c aca	a gac c Asp	259
tcc Ser	gaa Glu 55	aag Lys	cgc Arg	get Ala	geo Ala	gtg Val 60	Leu	atg Met	cta Leu	ttt Phe	tct Ser 65	Gly	tco Ser	gaa Glu	a acc ı Thr	307
tcc Ser 70	ttt Phe	gac Asp	ctg Leu	ccc Pro	aat Asn 75	Asp	gcc Ala	tcc Ser	gtg Val	ctg Leu 80	Leu	acg Thr	cac	ego	acc Thr 85	355
ccg (Pro '	acg Thr	atg Met	cgt Arg	tcc Ser 90	His	gca Ala	ggt Gly	cag Gln	att Ile 95	Ala	ttt Phe	ccc Pro	ggt Gly	ggc Gly 100	Arg	403
atc (gac Asp	ccc Pro	acc Thr 105	gat Asp	act Thr	aac Asn	gcc Ala	gtg Val 110	gac Asp	tgc Cys	gcc Ala	ttc Phe	cgc Arg 115	gag Glu	gcc Ala	451
tgg (Trp (JIU	gaa Glu 120	acc Thr	Gly	ctg Leu	gat Asp	cgc Arg 125	cgc Arg	acc Thr	gca Ala	acc Thr	cca Pro 130	tta Leu	gcc Ala	cag Gln	499
ctc a Leu A 1	ac Asn .35	gag Glu	gtg Val	cac His	atc Ile	cgt Arg 140	gcc Ala	acc Thr	gga Gly	tac Tyr	ccc Pro 145	gtc Val	tac Tyr	cca Pro	atc Ile	547
ctt g Leu G 150	ga ly	cac His	tgg Trp	cac His	acc Thr 155	cca Pro	tca Ser	ccc Pro	gtc Val	gcc Ala 160	gtg Val	gcc Ala	agc Ser	cca Pro	cac His 165	595
gaa a Glu T	cc (gac Asp	gaa Glu	gtt Val 170	ttg Leu	gac Asp	gcc Ala	cca Pro	ctc Leu 175	tac Tyr	gac Asp	ctc Leu	atc Ile	gac Asp 180	ccc Pro	643
aaa a Lys A	ac d sn <i>l</i>	119	ctc Leu 185	atg Met	gtc Val	ggc Gly	tgg Trp	cgc Arg 190	gaa Glu	tgg Trp	cac His	gga Gly	cca Pro 195	gcg Ala	ttt Phe	691
cga a Arg I	10 F	aac Asn 200	gac Asp	tac Tyr	atc Ile	тте	tgg Trp 205	gga Gly	ttc Phe	acc Thr	ggc Gly	gga Gly 210	cta Leu	ctc Leu	tcc Ser	739
gcg a Ala I 2	tc c le I 15	etc d Leu <i>l</i>	gac Asp	acc Thr	Ата	ggc Gly 220	tgg Trp	gcc Ala	acc Thr	Glu	tgg Trp 225	gac Asp	acc Thr	gac Asp	cgc Arg	787
atc to Ile Ph 230	tc g ne A	sp l	ctg Leu	GIU	aat Asn 235	aca : Thr :	ttg Leu	tca Ser	Thr	tct Ser 240	cgc Arg	aac Asn	aat Asn	gag Glu	cgt Arg 245	835

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Arg Ile His Thr Gly Arg Met Ala Asn Pro Leu Asp Gly Ala Glu Thr 35 40 45

Leu Gly Asp Thr Asp Ser Glu Lys Arg Ala Ala Val Leu Met Leu Phe 50 55 60

Ser Gly Ser Glu Thr Ser Phe Asp Leu Pro Asn Asp Ala Ser Val Leu 65 70 75 80

Leu Thr His Arg Thr Pro Thr Met Arg Ser His Ala Gly Gln Ile Ala 85 90 95

Phe Pro Gly Gly Arg Ile Asp Pro Thr Asp Thr Asn Ala Val Asp Cys 100 105 110

Ala Phe Arg Glu Ala Trp Glu Glu Thr Gly Leu Asp Arg Arg Thr Ala 115 120 125

Thr Pro Leu Ala Gln Leu Asn Glu Val His Ile Arg Ala Thr Gly Tyr 130 140

Pro Val Tyr Pro Ile Leu Gly His Trp His Thr Pro Ser Pro Val Ala 145 150 155 160

Val Ala Ser Pro His Glu Thr Asp Glu Val Leu Asp Ala Pro Leu Tyr 165 170 175

Asp Leu Ile Asp Pro Lys Asn Arg Leu Met Val Gly Trp Arg Glu Trp 180 185 190

His Gly Pro Ala Phe Arg Ile Asn Asp Tyr Ile Ile Trp Gly Phe Thr 195 200 205

Gly Gly Leu Leu Ser Ala Ile Leu Asp Thr Ala Gly Trp Ala Thr Glu 210 215 220

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Arg Asn Asn Glu Arg Met Arg 245

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<211> 597

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						gagto	g gto L Val	g gag	rctç	y ttg	g aaa Lys	ı tca	cac	: aat	gaa Glu 10	112
acg Thr	cto Leu	gco Ala	j ttt Phe	tgt Cys	GIU	tcc Ser	ctc Leu	acc Thr	gcc Ala 20	Gly	ctt Leu	gcc Ala	agt Ser	gcg Ala 25	acg Thr	160
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acc Thr	tat Tyr	gcc Ala 45	TiiT	gag Glu	ctt Leu	aag Lys	gtt Val 50	gcg Ala	ctt Leu	gcc Ala	ggt Gly	gtg Val 55	ccg Pro	cag Gln	gag Glu	256
ctt Leu	atc Ile 60	gac Asp	gcg Ala	cac His	ggc Gly	gtt Val 65	gtt Val	tcc Ser	ccg Pro	cag Gln	tgc Cys 70	gcc Ala	cgt Arg	gcg Ala	atg Met	304
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acg Thr	ggc Gly	gtt Val	gct Ala	ggc Gly 95	ccc Pro	agc Ser	aaa Lys	caa Gln	gat Asp 100	ggt Gly	cat His	ccg Pro	gtg Val	ggg Gly 105	gaa Glu	400
gtg Val	tgg Trp	atc Ile	gga Gly 110	gtg Val	gct Ala	ggt Gly	cct Pro	gcg Ala 115	cat His	ttt Phe	Gly ggg	gcg Ala	tcg Ser 120	gga Gly	aca Thr	448
att Ile	gac Asp	gcg Ala 125	tat Tyr	cgt Arg	gcg Ala	ttt Phe	gaa Glu 130	agt Ser	gaa Glu	caa Gln	cag Gln	gta Val 135	ata Ile	ttg Leu	gct Ala	496
	ttg Leu 140	gga Gly	cgg Arg	cat His	cat His	att Ile 145	aga Arg	gag Glu	tct Ser	gct Ala	gtg Val 150	cag Gln	caa Gln	agc Ser	ttt Phe	544
cgc Arg 155	ctg Leu	ctg Leu	att Ile	ASD	cat His 160	att Ile	gag Glu	tcg Ser	cag Gln	tgac	tcaa	gt t	tcca	ggta	a	594
act																597

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<400> 134

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20 25 30

Ala Ser Val Val Leu Lys Gly Gly Leu Val Thr Tyr Ala Thr Glu Leu 35 40 45

Lys Val Ala Leu Ala Gly Val Pro Gln Glu Leu Ile Asp Ala His Gly 50 55 60

Val Val Ser Pro Gln Cys Ala Arg Ala Met Ala Thr Gly Ala Ala His 65 70 75 80

Arg Cys Gln Ala Asp Trp Ala Val Ser Leu Thr Gly Val Ala Gly Pro 85 90 95

Ser Lys Gln Asp Gly His Pro Val Gly Glu Val Trp Ile Gly Val Ala

Gly Pro Ala His Phe Gly Ala Ser Gly Thr Ile Asp Ala Tyr Arg Ala 115 120 125

Phe Glu Ser Glu Gln Gln Val Ile Leu Ala Glu Leu Gly Arg His His 130 135 140

Ile Arg Glu Ser Ala Val Gln Gln Ser Phe Arg Leu Leu Ile Asp His 145 150 155 160

Ile Glu Ser Gln

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Met Lys Pro Thr Val

1

aat gtt gtg ttc aat gcg cat cac ccc aaa gat acg cag ccg ttg gat
Asn Val Val Phe Asn Ala His His Pro Lys Asp Thr Gln Pro Leu Asp
10 15

aag ttc ttc gat aaa gaa ctt aaa gac aca cat cat ctc gat ata acg 211 Lys Phe Phe Asp Lys Glu Leu Lys Asp Thr His His Leu Asp Ile Thr

25 30 35 gtg ggt tat atc agt gag aaa tca cta caa tat ttg ctt ctt att gca 259 Val Gly Tyr Ile Ser Glu Lys Ser Leu Gln Tyr Leu Leu Ile Ala ggc act tac ccc gac ctc acc att aca ctt acc tgt gga atg cac gct 307 Gly Thr Tyr Pro Asp Leu Thr Ile Thr Leu Thr Cys Gly Met His Ala cgt gaa ggc atg act gct gcc caa ctg cat cat gcg cga gtg ctc cat 355 Arg Glu Gly Met Thr Ala Ala Gln Leu His His Ala Arg Val Leu His gac tac tta age gac cat gat ega gge ggg gtg tte gtt att eee ega 403 Asp Tyr Leu Ser Asp His Asp Arg Gly Gly Val Phe Val Ile Pro Arg 95 ttg cgt tat cac ggg aaa atc tat ctt ttc cac aag aac cag cac aca 451 Leu Arg Tyr His Gly Lys Ile Tyr Leu Phe His Lys Asn Gln His Thr 105 110 gat cet att get tat ate ggt age get aae ete tea gee ate gtt eet 499 Asp Pro Ile Ala Tyr Ile Gly Ser Ala Asn Leu Ser Ala Ile Val Pro 120 125 ggg tac acc tet aca tte gag eee gge gte ate tta gac eee gea eet 547 Gly Tyr Thr Ser Thr Phe Glu Pro Gly Val Ile Leu Asp Pro Ala Pro 135 140 gaa gat ctc gtg ctt cat ctc aac cgt gat gtc gta ccc cta tgt gtc 595 Glu Asp Leu Val Leu His Leu Asn Arg Asp Val Val Pro Leu Cys Val 150 155 ccc att gac acc gcg cat gtc ccc atc att aaa gat caa gaa tcc ccg 643 Pro Ile Asp Thr Ala His Val Pro Ile Ile Lys Asp Gln Glu Ser Pro 170 atg aag cac gtc gct gaa gca aca gct gtg tcc acc tct gat gtt gtt 691 Met Lys His Val Ala Glu Ala Thr Ala Val Ser Thr Ser Asp Val Val 185 190 gee ate atg tee age eea ttt act tat agt ttt gae ett aaa ete aaa 739 Ala Ile Met Ser Ser Pro Phe Thr Tyr Ser Phe Asp Leu Lys Leu Lys 200 205 gee act gee age age cte aat get cat aac tea gge ggt gge geg 787 Ala Thr Ala Ser Ser Asn Leu Asn Ala His Asn Ser Gly Gly Ala 215 cgc aaa cag aaa aac ggt agc ttc ctt gca cgc aat tgg tat gag ggc 835 Arg Lys Gln Lys Asn Gly Ser Phe Leu Ala Arg Asn Trp Tyr Glu Gly 230 235 gaa atc att gtc ggt gtc gag aca aca aga ctc cca ggt tac cca caa Glu Ile Ile Val Gly Val Glu Thr Thr Arg Leu Pro Gly Tyr Pro Gln 250 aac aaa tcc gaa ttc act gcg ggt cac tgatgacggc tggtcatttg 930 Asn Lys Ser Glu Phe Thr Ala Gly His 265

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<211> 270

<212> PRT

<213> Corynebacterium glutamicum

<400> 136

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His Leu Asp Ile Thr Val Gly Tyr Ile Ser Glu Lys Ser Leu Gln Tyr

Leu Leu Ile Ala Gly Thr Tyr Pro Asp Leu Thr Ile Thr Leu Thr

Cys Gly Met His Ala Arg Glu Gly Met Thr Ala Ala Gln Leu His His

Ala Arg Val Leu His Asp Tyr Leu Ser Asp His Asp Arg Gly Gly Val

Phe Val Ile Pro Arg Leu Arg Tyr His Gly Lys Ile Tyr Leu Phe His

Lys Asn Gln His Thr Asp Pro Ile Ala Tyr Ile Gly Ser Ala Asn Leu

Ser Ala Ile Val Pro Gly Tyr Thr Ser Thr Phe Glu Pro Gly Val Ile 135

Leu Asp Pro Ala Pro Glu Asp Leu Val Leu His Leu Asn Arg Asp Val 155

Val Pro Leu Cys Val Pro Ile Asp Thr Ala His Val Pro Ile Ile Lys

Asp Gln Glu Ser Pro Met Lys His Val Ala Glu Ala Thr Ala Val Ser 185

Thr Ser Asp Val Val Ala Ile Met Ser Ser Pro Phe Thr Tyr Ser Phe 200

Asp Leu Lys Leu Lys Ala Thr Ala Ser Ser Asn Leu Asn Ala His Asn 210 215

Ser Gly Gly Gly Ala Arg Lys Gln Lys Asn Gly Ser Phe Leu Ala Arg 230

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Pro Gly Tyr Pro Gln Asn Lys Ser Glu Phe Thr Ala Gly His 265

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teg	rteca	ıcat	caac	gtca	at a	aaac	taag	a gg	aatt	aaaa	atg Met 1	gct Ala	ccc Pro	aag Lys	aag Lys 5	115
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ctt Leu	gat Asp	gcc Ala	gca Ala 25	Leu	gcc Ala	ctg Leu	att Ile	gag Glu 30	aag Lys	gat Asp	ttc Phe	ggt Gly	aaa Lys 35	ggc	gct Ala	211
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Ala Gln Arg Gly Ala Val Leu Gly Ile Gly Gly Val Thr Ala Leu Trp

tct gga ctg ggg tgg atg gcg aac ctg cgc ttt gga gtt tcc cgc atg

125

120

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cat g His G	aa a lu I	ltt d	-3p	cca (Pro (330	ggt (Gly (gaa g Glu G	gaa q Slu V	/al	tcc Ser 335	caa Gln	tct Ser	gct Ala .	Arg	aaa Lys 340	gtg Val	1123
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Gly Ala Lys Gly Gly Asn Gln Leu Ser Ala Gly Ile Thr Tyr Phe Ser 50 60

Val Leu Ser Ile Phe Pro Ile Ala Met Leu Val Phe Gly Ile Ala Gly 65 70 75 80

Val Ile Leu Ala Gly Asn Pro Glu Val Leu Thr Asp Ile Gln Asn Arg 85 90 95

Ile Asn Asp Ala Leu Glu Gly Glu Ile Gly Asn Thr Val Asn Gly Ile 100 105 110

Ile Asp Ser Ala Ile Ala Gln Arg Gly Ala Val Leu Gly Ile Gly Gly 115 120 125

Val Thr Ala Leu Trp Ser Gly Leu Gly Trp Met Ala Asn Leu Arg Phe 130 135 140

Gly Val Ser Arg Met Trp Ala Ile Asp Pro Thr Glu Gly Asn Phe Ile 145 150 155 160

Gln Lys Lys Leu Thr Asp Leu Val Ala Leu Ile Val Leu Leu Ala 165 170 175

Met Gly Val Ala Phe Gly Ile Thr Ala Leu Gly Ala Ser Gly Leu Thr 180 185 190

Lys Asn Leu Leu Asp Phe Val Gly Leu Gly Glu Ile Pro Gly Ile Ser

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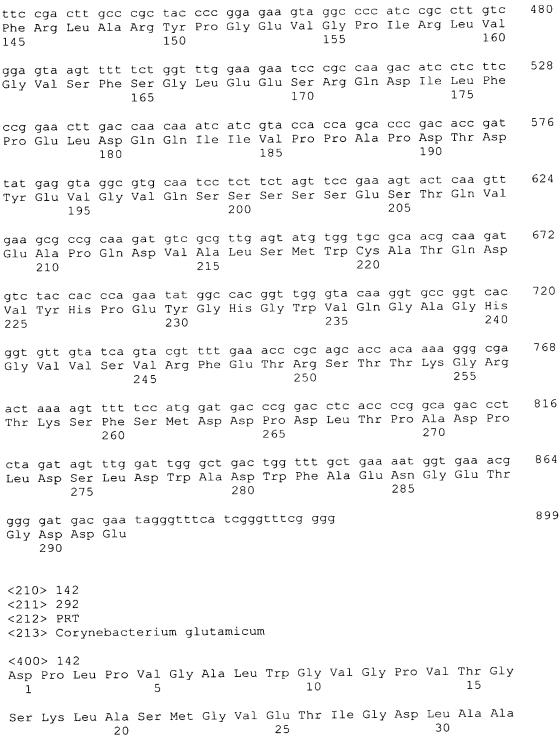
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Ser Glu Glu Ala Leu Arg Leu Ala Thr Val Pro Ala Pro Glu Pro Ala 310 Ile Ile Arg Val Arg His Glu Ile Asp Pro Gly Glu Glu Val Ser Gln Ser Ala Arg Lys Val Gly Ile Gly Val Ala Val Gly Ala Ala Thr Ala Gly Ala Phe Ala Leu Leu Arg Lys Lys <210> 141 <211> 899 <212> DNA <213> Corynebacterium glutamicum <220> <221> CDS <222> (1)..(876) <223> RXN02431 <400> 141 gat cca ctt cct gtg ggc gca ctt tgg gga gtg ggt cct gtg aca ggc 48 Asp Pro Leu Pro Val Gly Ala Leu Trp Gly Val Gly Pro Val Thr Gly 1.0 tcc aag ctt gcc tca atg ggg gtg gaa aca att ggt gat cta gca gcg 96 Ser Lys Leu Ala Ser Met Gly Val Glu Thr Ile Gly Asp Leu Ala Ala 25 cta acc caa aaa gaa gta gaa atc agc ctc ggt gca acc atc gga ata 144 Leu Thr Gln Lys Glu Val Glu Ile Ser Leu Gly Ala Thr Ile Gly Ile tca ctg tgg aac ctt gcc cga gga atc gac gac cgc cct gtg gaa ccc 192 Ser Leu Trp Asn Leu Ala Arg Gly Ile Asp Asp Arg Pro Val Glu Pro ege gee gaa gea aaa cag ate tee caa gag eae ace tat gaa aaa gae 240 Arg Ala Glu Ala Lys Gln Ile Ser Gln Glu His Thr Tyr Glu Lys Asp ctc ctc acc agg caa caa gta gat gct gcc atc att cga tca gcc gaa 288 Leu Leu Thr Arg Gln Gln Val Asp Ala Ala Ile Ile Arg Ser Ala Glu ggc gca cac cga cgg ctc ctc aaa gac gga cgc ggt gcc aga act gtc 336 Gly Ala His Arg Arg Leu Leu Lys Asp Gly Arg Gly Ala Arg Thr Val 105 agc gtg aaa ctg cgg atg gcc gac ttt cgt att gag tct cgt tcc tac 384 Ser Val Lys Leu Arg Met Ala Asp Phe Arg Ile Glu Ser Arg Ser Tyr 120 acc ttg tcc tat gcc acc gat gat tac gca act ctt gag gca aca gca 432 Thr Leu Ser Tyr Ala Thr Asp Asp Tyr Ala Thr Leu Glu Ala Thr Ala 135



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gc: Ala	c cti a Lei	t cti ı Lei	acq Thr 25	GIL	g ago n Aro	ı cag ı Gln	ratt Ile	cct Pro	Phe	gaç Glu	g cto ı Lev	g gat 1 Asp	gtt Val 35	His	gat Asp	211
gta Val	a gat L Asp	cca Pro 40	ьras	tca Ser	tca Ser	aag Lys	ggc Gly 45	Phe	gca Ala	ttg Leu	gat Asp	gcc Ala 50	tct Ser	gaa Glu	gta Val	259
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gat Asp 70	, сту	gaa Glu	cac His	gtg Val	gtc Val 75	gcg Ala	att Ile	gtt Val	cca Pro	gcc Ala 80	Ser	aga Arg	acg Thr	ttg Leu	aat Asn 85	355
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                                              Val Phe Leu Asp Glu
 tet gea att ete cag gag ega ate tae gte age gea ggg ega ege ggg
                                                                    163
 Ser Ala Ile Leu Gln Glu Arg Ile Tyr Val Ser Ala Gly Arg Arg Gly
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 Trp Ser Leu Ile Ile Ala Pro Asp Asp Val Leu Leu Ala Thr Asp Gly
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                                             Val Thr Glu Lys Thr
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		_	-	-	_					_	_	ggc Gly		_	-	211
												acg Thr 50				259
												gtg Val				307
_		_		_	_		_			_		cag Gln	_	_	-	355
												aag Lys				403
												ttt Phe				451
												tta Leu 130				499
												ttg Leu				547
		_		_		_	_	_				gtg Val				595
	_	•	_	_				-			-	aca Thr				643
												gat Asp				691
												tgg Trp 210				739
												gag Glu			ggc Gly	787
aag Lys 230	gtt Val	ggc Gly	gcc Ala	agc Ser	ctg Leu 235	cgt Arg	gag Glu	cgc Arg	att Ile	gag Glu 240	Gln	gtc Val	cgg Arg	atg Met	aac Asn 245	835





					atg Met										883
_	_			_	aag Lys			_	-	 	_	-			931
					ttt Phe										979
		_	_		ggt Gly		_	-		 	_				1027
-	_	-	-	_	gat Asp 315	_									1075
					ctt Leu										1123
					tat Tyr										1171
					gtg Val										1219
					gcg Ala										1267
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_					gcc Ala	_	-		_				_	cag Gln	1411
					aat Asn										1459
					gtt Val										1507
					cag Gln 475					Ala				tac Tyr 485	1555

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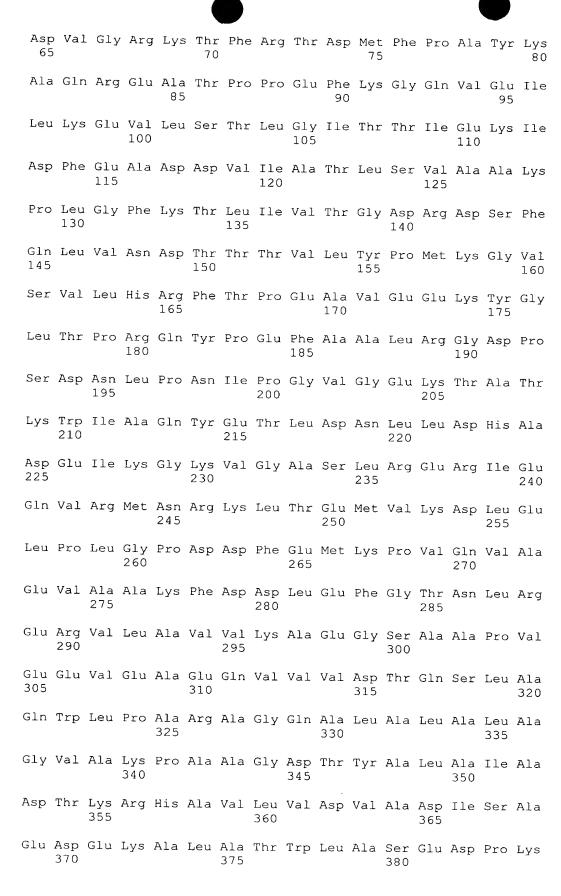
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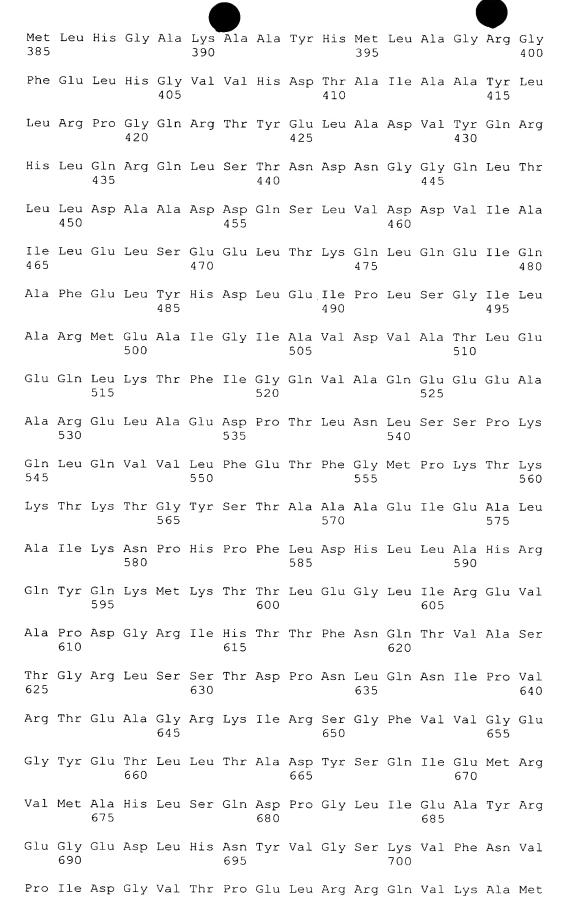
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BGI-127CP - 205 -



705 710 715 720 Ser Tyr Gly Leu Val Tyr Gly Leu Ser Ala Phe Gly Leu Ser Gln Gln 730 Leu Ser Ile Pro Ala Gly Glu Ala Lys Gln Ile Met Glu Ser Tyr Phe 745 Glu Arg Phe Gly Gly Val Gln Arg Tyr Leu Arg Glu Ile Val Glu Glu 760 Ala Arg Lys Ala Gly Tyr Thr Glu Thr Leu Phe Gly Arg Arg Tyr 775 Leu Pro Glu Leu Thr Ser Asp Asn Arg Val Ala Arg Glu Asn Ala Glu Arg Ala Ala Leu Asn Ala Pro Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Val Ala Met Ile Arg Val Asp Arg Ser Leu Lys Glu Ala Ala Val 825 Lys Ser Arg Val Leu Leu Gln Val His Asp Glu Leu Val Val Glu Val 840 Ala Ala Gly Glu Leu Glu Gln Val Arg Glu Ile Leu Glu Arg Glu Met 855 Asp Asn Ala Ile Lys Leu Ser Val Pro Leu Glu Val Ser Ala Gly Asp 870 875 Gly Val Asn Trp Asp Ala Ala Ala His 885 <210> 149 <211> 1683 <212> DNA <213> Corynebacterium glutamicum <220> <221> CDS <222> (101)..(1660) <223> RXS00212 <400> 149 ttagagegtg cegetaeteg tggtgatggt egegtgggeg aggaeateae ggeeaatget 60 cgcgtgatcg aagatatccc gcaccagctt cagggcactg atg aat atc ctg tgc 115 Met Asn Ile Leu Cys ctg ctg tgc tgg aaa ttc gcg gtg agg tgt tca tca ctg tgg agg att Leu Leu Cys Trp Lys Phe Ala Val Arg Cys Ser Ser Leu Trp Arg Ile 163 10 tcc cag gag gtc aac gcg cag cgc att gct gat ggt ggc aag ccg ttt Ser Gln Glu Val Asn Ala Gln Arg Ile Ala Asp Gly Gly Lys Pro Phe 211 25 30 35

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Gly Gly Lys Pro Phe Ala Asn Pro Arg Asn Ala Ala Gly Ser Leu 35 40 45

Arg Gln Lys Asn Ile Glu Asp Val Lys Lys Arg Arg Leu Arg Met Ile 50 55 60

Ser His Gly Ile Gly Phe Thr Glu Gly Phe Ser Pro Ala Ser Gln His 65 70 75 80

Asp Ala Tyr Leu Ala Leu Ala Ala Trp Gly Leu Pro Thr Ser Pro Tyr 85 90 95

Thr Glu Ala Val Thr Asp Pro Glu Asp Val Val Lys Lys Val Ser Tyr
100 105 110

Trp Ala Asp His Arg His Asp Ala Leu His Glu Met Asp Gly Leu Val 115 120 125

Ile Lys Val Asp Asp Ile Ala Ser Gln Arg Ala Leu Gly Ser Thr Ser 130 135 140

Arg Ala Pro Arg Trp Ala Ile Ala Tyr Lys Tyr Pro Pro Glu Glu Val 145 150 155 160

Thr Thr Lys Leu Leu Asp Ile Gln Val Gly Val Gly Arg Thr Gly Arg 165 170 175

Val Thr Pro Phe Ala Val Met Glu Pro Val Leu Val Ala Gly Ser Thr 180 185 190

Val Ser Met Ala Thr Leu His Asn Gln Ser Glu Val Lys Arg Lys Gly 195 200 205

Val Leu Ile Gly Asp Thr Val Val Ile Arg Lys Ala Gly Glu Val Ile 210 215 220

Pro Glu Val Leu Gly Pro Val Val Glu Leu Arg Asp Gly Thr Glu Arg 225 230 235 240

Glu Tyr Ile Phe Pro Thr Leu Cys Pro Glu Cys Gly Thr Arg Leu Ala 245 250 255

Pro Ala Lys Ala Asp Asp Val Asp Trp Arg Cys Pro Asn Met Gln Ser 260 265 270

Cys Pro Gly Gln Leu Ser Thr Arg Leu Thr Tyr Leu Ala Gly Arg Gly

275 280 285

Ala Phe Asp Ile Glu Ala Leu Gly Glu Lys Gly Ala Glu Asp Leu Ile 290 295 300

Arg Thr Gly Ile Leu Leu Asp Glu Ser Gly Leu Phe Asp Leu Thr Glu 305 310 315

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Asn Ala Ser Gly Lys Lys Leu Leu Asp Asn Leu Gln Lys Ser Lys Gln 340 345 350

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Pro Thr Ala Ala Arg Ala Leu Ala Gly Arg Tyr His Ser Ile Gln Ala 370 380

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Lys Ala Ile Val Asp Lys Trp Ala Ala Ala Gly Val Thr Met Glu Glu 420 425 430

Glu Val Gly Glu Val Ala Glu Gln Thr Leu Glu Gly Leu Thr Ile Val 435 440 445

Val Thr Gly Gly Leu Glu Gly Phe Thr Arg Asp Ser Val Lys Glu Ala 450 455 460

Ile Ile Ser Arg Gly Gly Lys Ala Ser Gly Ser Val Ser Lys Lys Thr 465 470 475 480

Asp Tyr Val Val Ile Gly Glu Asn Ala Gly Ser Lys Ala Thr Lys Ala 485 490 495

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BGI-127CP - 215 -

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	cgt Arg															1795
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-	ggt Gly					_										1891
_	gtg Val	_			_	_			_	-				_		1939
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Leu Pro Gly Gly Arg Arg Pro Ile Gln Thr Ser Val Ile Pro Asp His 420 425 430

Lys Pro Gly Trp Val Lys Arg Gly Trp Glu Arg Ile Gly Glu Glu Val 435 440 445

Leu Ala Gly Arg Gln Ala Tyr Val Val Cys Pro Arg Ile Glu Gly Glu 450 455 460

Gly Gly Val Leu Glu Ile His Ala Tyr Leu Ser Glu Gln Val Tyr Pro 465 470 475 480

Gly Leu Asn Val Gly Met Leu His Gly Arg Met Asp Thr Asp Leu Lys 485 490 495

Asp Ser Val Met Gln Glu Phe Ala Gln Gly Glu Ile Asp Ile Leu Val 500 505 510

Ala Thr Val Ile Glu Val Gly Ile Asp Val Ala Asn Ala Thr Val 515 520 525

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Leu Arg Gly Arg Val Gly Arg Gly Gln His Asp Ser Leu Cys Leu 545 550 555 555

His Thr Thr Phe Asp Glu Asp Ser Pro Gln Gly Gln Arg Leu Ala Ala 565 570 575

Ile Ser Thr Thr Thr Asp Gly Phe Gln Leu Ser Glu Leu Asp Leu Gln 580 585 590

Val Arg Gln Glu Gly Asp Val Leu Gly Thr Arg Gln Ser Gly Ser Asp 595 600 605

Thr Lys Leu Arg His Leu Ser Phe Ile Ser Asp Gln Lys Ile Ile Glu 610 615 620

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835

880

903

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20

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Phe Gly Ser Arg Leu Gln Leu Phe Val Glu Leu Asp Val Gln Leu Tyr 50 55 60

Pro Gly Arg Lys Leu Ser Thr Ile Ser Gly Ala Asp Thr Val Gly Tyr 65 70 75 80

Tyr Ala Ser Gly Ile Ile Glu Asp Phe Thr Arg Tyr Ser Cys Ala Ser 85 90 95

Ala Ile Leu Glu Ile Ala Thr His Ile Ala Gly Leu Glu As
n Asp Pro 100 $$ 100 $$ 105 $$ 110

His Leu Phe Glu Glu Thr Thr Arg Ala Leu Lys Asn Ile Gln Asp Ser 115 120 125

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Pro Gly Pro His Asn Ala Phe His Pro Gly Val Gly Gly Ala Val Cys 165 170 175

Leu Tyr Cys Arg Pro Pro Gly Ser Ala Glu Val Pro Pro Glu Ala Leu 180 185 190

His Met Met Trp Leu Val Ala Asn Gly Gln Ala Ala Arg Ile Pro Arg 195 200 205

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490

1651

1699

1740

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Tyr Gln Lys His Thr Gln Phe Pro Gly Ala Gly Arg Thr Glu Asn Asn 230 Val Ile Gly Ile Arg Ile Met Pro Leu Phe Ala Val Lys Ala Val Ala Phe Gly Leu Ile Val Phe Gly Phe Leu Ala Leu Leu Ala Gly Val Thr Thr Ile Asn Ala Ile Trp Asn Leu Gly Pro Tyr Asn Pro Ser Gln Val Ser Ala Gly Ser Gln Pro Asp Val Tyr Met Leu Trp Thr Asp Gly Ala 295 Ala Arg Val Met Pro Ala Trp Glu Leu Tyr Leu Gly Asn Tyr Thr Ile 310 Pro Ala Val Phe Trp Val Ala Val Met Leu Gly Ile Leu Val Val Leu 325 Leu Val Thr Tyr Pro Phe Ile Glu Arg Lys Phe Thr Gly Asp Asp Ala 345 His His Asn Leu Leu Gln Arg Pro Arg Asp Val Pro Val Arg Thr Ser Leu Gly Val Met Ala Leu Val Phe Tyr Ile Leu Leu Thr Val Ser Gly 375 Gly Asn Asp Val Tyr Ala Met Gln Phe His Val Ser Leu Asn Ala Met 395 Thr Trp Ile Gly Arg Ile Gly Leu Ile Val Gly Pro Ala Ile Ala Tyr Phe Ile Thr Tyr Arg Leu Cys Ile Gly Leu Gln Arg Ser Asp Arg Glu Val Leu Glu His Gly Ile Glu Thr Gly Ile Ile Lys Gln Met Pro Asn Gly Ala Phe Ile Glu Val His Gln Pro Leu Gly Pro Val Asp Asp His 455 Gly His Pro Ile Pro Leu Pro Tyr Ala Gly Ala Ala Val Pro Lys Gln Met Asn Gln Leu Gly Tyr Ala Glu Val Glu Thr Arg Gly Gly Phe Phe Gly Pro Asp Pro Glu Asp Ile Arg Ala Lys Ala Lys Glu Ile Glu His 505 Ala Asn His Ile Glu Glu Ala Asn Thr Leu Arg Ala Leu Asn Glu Ala Asn Ile Glu Arg Asp Lys Asn Glu Gly Lys Asn

535

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gcg ctg agg Ala Leu Arg	ttg aag (Leu Lys (90	gaa tgt g Glu Cys A	gcg gag la Glu	gtg atc Val Ile 95	gtc gaa Val Glu	aag cat Lys His 100	gcc 40 Ala	3
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tgg Trp	cct Pro	gac Asp	gat Asp 265	gcc Ala	caa Gln	cgc Arg	tcc Ser	cgg Arg 270	gcg Ala	ctg Leu	ttt Phe	tcg Ser	ctc Leu 275	att Ile	gag Glu	931
gac Asp	gga Gly	ctc Leu 280	gcg Ala	gaa Glu	caa Gln	aat Asn	gag Glu 285	gcg Ala	ggt Gly	tat Tyr	ttc Phe	cac His 290	ctg Leu	cca Pro	cgg Arg	979
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His Phe Gly Gln Arg Val Pro Val Val Asp Thr Asn Val Arg Arg Val 135 Tyr Gln Arg Ala Val Ala Gly Arg Tyr Leu Ala Gly Pro Ala Lys Lys 150 155 Gln Glu Leu Ile Asp Val Ser Leu Leu Pro Asn Thr His Ala Pro 165 Glu Phe Ser Ala Ala Ile Met Glu Leu Gly Ala Leu Ile Cys Thr Ala Thr Ser Pro Lys Cys Asp Thr Cys Pro Leu Leu Asp Gln Cys Gln Trp Gln Lys Leu Gly Cys Pro Ser Pro Ser Glu Glu Glu Leu Ala Ser Ala Lys Lys Arg Val Gln Lys Phe Val Gly Thr Asp Arg Gln Val Arg Gly Leu Ile Met Asp Val Leu Arg Asn Ala Thr Ala Pro Val Pro Leu Ser 250 Ala Ile Asp Val Val Trp Pro Asp Asp Ala Gln Arg Ser Arg Ala Leu 260 265 Phe Ser Leu Ile Glu Asp Gly Leu Ala Glu Gln Asn Glu Ala Gly Tyr 280 Phe His Leu Pro Arg 290 <210> 165 <211> 720 <212> DNA <213> Corynebacterium glutamicum <220> <221> CDS <222> (101)..(697) <223> RXS02990 <400> 165 gaagactaag caccagtttt aacaaagcag ggacaatcca cacacttaaa ccatgatgtg 60 gcttqttcct gctttttcgt caacgaaggg caacaacgcg atg gat atc caa gcc 115 Met Asp Ile Gln Ala 1 gaa aag att gaa aag ctc aga aaa gca ctc gac aac ttt gaa cgc gct 163 Glu Lys Ile Glu Lys Leu Arg Lys Ala Leu Asp Asn Phe Glu Arg Ala 10 20 cat gcg cga ggc gaa tca gac ttc ttt gac cat gaa aaa gaa gaa aag 211 His Ala Arg Gly Glu Ser Asp Phe Phe Asp His Glu Lys Glu Glu Lys 25 30 aaa gcc aac gta cgc aga cgt gcc ctg ctg ctt aac caa cgc gca 259

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Leu Asn Gln Arg Ala Arg Ser Val Asn Glu Leu Ser Thr Arg Leu Lys 50 55 60

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Thr	Arg	Ser	Lys	Leu 85	Leu	Asp	Asp	Glu	Val 90	Phe	Ala	Thr	Glu	Trp 95		
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Tyr	Asp	Lys	Ala	Leu 165	Arg	Arg	Val	Val	Gly 170	Ala	Leu	Ala	Arg	Arg 175	Gly	
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tgg Trp	tgo Trp	g gac Asp	acc Thr 105	Val	gat Asp	tcc Ser	cta Leu	gca Ala 110	Lys	cco Pro	g atc	ggc Gly	gcc Ala 115	Lys	cac His	451
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cgc Arg	cgc Arg 135	тте	gcg Ala	atc Ile	atc Ile	cac His 140	caa Gln	ctg Leu	ggc Gly	cgc Arg	aag Lys 145	aaa Lys	aac Asn	acc Thr	gac Asp	547
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Gln	Phe	Ser 35	Phe	Leu	Gly	Ile	Pro 40	Ser	Thr	Pro	Arg	Lys 45	Glu	Ala	Cys	
Lys	Pro 50	Val	Leu .	Ser /	Ala	Leu 55	Lys	Glu	Leu	Asp	Thr 60	Asp	Phe	Val	Ser	
Asp 65	Cys	Phe	Gly A	Ala A	Ala (Glu .	Arg	Glu	Tyr	Gln 75	Tyr	Val .	Ala	Cys .	Asp 80	

His Ile Asn Arg Val Gly Ile Thr Asp Leu Gly Phe Ala Lys Ala Leu 85 Val Gln Thr Lys Ser Trp Trp Asp Thr Val Asp Ser Leu Ala Lys Pro Ile Gly Ala Lys His Asp Asp Asp Leu Met Lys Thr Trp Ala Leu Asp Glu Asp Phe Trp Val Arg Arg Ile Ala Ile Ile His Gln Leu Gly Arg Lys Lys Asn Thr Asp Ala Ala Leu Leu Ala Trp Ile Ile Glu Gln Asn 155 Leu Gly Ser Ser Glu Phe Phe Ile Asn Lys Ala Ile Gly Trp Ala Leu 165 Arg Asp Phe Ala Arg His Asp Pro Ser Trp Val Arg Ala Phe Val Asp 185 Ala Thr Asp Leu Ser Pro Leu Ser Arg Arg Glu Ala Leu Lys Asn Ile 195 <210> 169 <211> 806 <212> DNA <213> Corynebacterium glutamicum <220> <221> CDS <222> (1)..(783) <223> RXS03175 <400> 169 gto ege gea age gaa aaa gae ace gee ace gea etg caa eee gee tta 48 Val Arg Ala Ser Glu Lys Asp Thr Ala Thr Ala Leu Gln Pro Ala Leu gat aac gga tgg cac tac att ggt gcc cca gca gct gcc aag gga cgt 96 Asp Asn Gly Trp His Tyr Ile Gly Ala Pro Ala Ala Ala Lys Gly Arg 20 gcc ggt gtc ggc att ttg tct agg cat gaa ctt gaa gat gtg aac atc 144 Ala Gly Val Gly Ile Leu Ser Arg His Glu Leu Glu Asp Val Asn Ile ggt ttt gga tct ttc ctt gac tcc ggc cgc tac att gaa gca acc atc 192 Gly Phe Gly Ser Phe Leu Asp Ser Gly Arg Tyr Ile Glu Ala Thr Ile aaa gac acc acc ctg gat gtg cca gta acc gtg gca tct ctt tac ctc 240 Lys Asp Thr Thr Leu Asp Val Pro Val Thr Val Ala Ser Leu Tyr Leu 75 ccc tca ggt tca gcg ggc acc gac aag cag gat gaa aag tac cgc ttc Pro Ser Gly Ser Ala Gly Thr Asp Lys Gln Asp Glu Lys Tyr Arg Phe

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Gly Phe Gly Ser Phe Leu Asp Ser Gly Arg Tyr Ile Glu Ala Thr Ile 50 55 60

Lys Asp Thr Thr Leu Asp Val Pro Val Thr Val Ala Ser Leu Tyr Leu 65 70 75 80

Pro Ser Gly Ser Ala Gly Thr Asp Lys Gln Asp Glu Lys Tyr Arg Phe \$85\$ 90 95

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His Met Val Ile Gly Gly Asp Trp Asn Ile Cys His Arg Arg Glu Asp 115 120 125

Leu Lys Asn Trp Lys Thr Asn Gln Lys Lys Ser Gly Phe Leu Pro Asp 130

Glu Arg Ala Phe Met Asp Ser Val Phe Gly Thr Phe Pro Asp Glu Ala 145 150 155 160

Thr Gln Val Ala Gly Ala Gly Asp Phe Phe Gly Ala Val Asp Tyr Glu 165 170 175

Gly Thr Arg Arg Arg Glu Ala Thr Thr Asp Pro Ala Trp Phe Asp Val

Ala Arg Arg Leu Gln Pro Glu Gly Asp Gly Pro Tyr Thr Trp Trp Thr 195 200 205

Tyr Arg Gly Lys Ala Phe Asp Thr Gly Ala Gly Trp Arg Ile Asp Tyr 210 215 220

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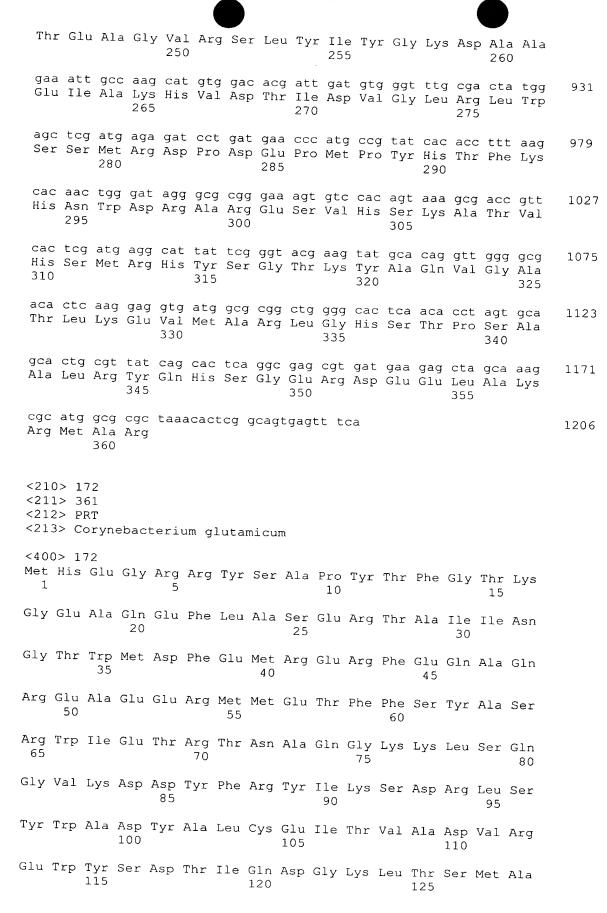
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					•								,			
arç Arç	a tac g Tyr	: tct Ser	gcc Ala	Pro) Tyr	acc Thr	ttc Phe	ggt Gly	Thr 15	Lys	ggt Gly	gag Glu	gcg Ala	cag Gln 20	gag Glu	163
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Arg Ser Tyr Ser Met Met Lys Ser Val Met Glu Thr Ala Val Glu Asp 135 Gly Ile Ile Pro Met Asn Pro Cys Lys Val Arg Gly Gly Gly Asn Thr Lys Thr Gly Lys Lys Val Asp Val Pro Thr Asp Ala Glu Leu Glu Ala Ile Ile Gly Ala Leu Pro Ser Lys Tyr Phe Cys Leu Ala Ile Val Ala 185 Ala Ala Gly Ala Leu Arg Phe Gly Glu Ile Val Ala Leu Arg Thr Thr Asp Val Asp Val Tyr Phe Asp Arg Ser Gly Phe Val Asp Cys Val Arg 215 Ile Arg Ile Ser Arg Ser Ile Arg His Thr Arg Tyr His Gly Arg Val 230 235 Glu Gly Pro Pro Lys Thr Glu Ala Gly Val Arg Ser Leu Tyr Ile Tyr 250 Gly Lys Asp Ala Ala Glu Ile Ala Lys His Val Asp Thr Ile Asp Val 260 265 Gly Leu Arg Leu Trp Ser Ser Met Arg Asp Pro Asp Glu Pro Met Pro 280 Tyr His Thr Phe Lys His Asn Trp Asp Arg Ala Arg Glu Ser Val His 290 295 Ser Lys Ala Thr Val His Ser Met Arg His Tyr Ser Gly Thr Lys Tyr 310 315 Ala Gln Val Gly Ala Thr Leu Lys Glu Val Met Ala Arg Leu Gly His 325 Ser Thr Pro Ser Ala Ala Leu Arg Tyr Gln His Ser Gly Glu Arg Asp 345 Glu Glu Leu Ala Lys Arg Met Ala Arg 355 360 <210> 173 <211> 1206 <212> DNA <213> Corynebacterium glutamicum <220> <221> CDS <222> (101)..(1183) <223> FRXA02890 <400> 173 actatgcgga aaagtggaag agggtttgcg atatatgcca cgatcgacga attgncgaga 60 gatcgaaaag ttgcgctcgc ggaggtacag ggcacgcttc atg cac gag ggt agg 115

Met His Glu Gly Arg cga tac tct gcc ccg cat acc ttc ggt acc aag ggt gag gcg cag gag 163 Arg Tyr Ser Ala Pro His Thr Phe Gly Thr Lys Gly Glu Ala Gln Glu ttc ttg gcc tct gaa cgc acg gcc atc atc aat ggc aca tgg atg gat 211 Phe Leu Ala Ser Glu Arg Thr Ala Ile Ile Asn Gly Thr Trp Met Asp ttt gag atg cgg gag agg ttc gag cag gca cag cgc gaa gcc gaa gaa 259 Phe Glu Met Arg Glu Arg Phe Glu Gln Ala Gln Arg Glu Ala Glu Glu cgc atg atg gag acc ttc ttc agt tat gca tcg agg tgg ata gaa acc 307 Arg Met Met Glu Thr Phe Phe Ser Tyr Ala Ser Arg Trp Ile Glu Thr cgg aca aat gcc caa gga aag aaa ctc agc caa ggg gtg aaa gat gat 355 Arg Thr Asn Ala Gln Gly Lys Lys Leu Ser Gln Gly Val Lys Asp Asp 80 tac ttt cgt tat ata aaa tca gat cga cta agt tat tgg gct gat tat 403 Tyr Phe Arg Tyr Ile Lys Ser Asp Arg Leu Ser Tyr Trp Ala Asp Tyr 90 gcg ctc tgt gaa atc act gtc gct gat gtc cgt gag tgg tat agc gat 451 Ala Leu Cys Glu Ile Thr Val Ala Asp Val Arg Glu Trp Tyr Ser Asp 105 110 act att cag gac ggt aaa ttg acc tca atg gcg cgg agt tac agc atg 499 Thr Ile Gln Asp Gly Lys Leu Thr Ser Met Ala Arg Ser Tyr Ser Met 130 atg aag tot gto atg gag act gca gtg gag gat ggc att atc ccg atg 547 Met Lys Ser Val Met Glu Thr Ala Val Glu Asp Gly Ile Ile Pro Met 145 aat ccg tgc aaa gtc cgt ggc ggg ggt aat acg aaa aca ggc aaa aag 595 Asn Pro Cys Lys Val Arg Gly Gly Gly Asn Thr Lys Thr Gly Lys Lys 155 160 gtt gat gtc cca acc gat gcc gag ctt gag gcg atc att ggt gca ctg 643 Val Asp Val Pro Thr Asp Ala Glu Leu Glu Ala Ile Ile Gly Ala Leu 170 ccg agt aag tac ttt tgt ttg gct att gtt gct gcc gct ggt gca ctt 691 Pro Ser Lys Tyr Phe Cys Leu Ala Ile Val Ala Ala Ala Gly Ala Leu cga ttc ggt gaa atc gtt gcg ctg cgt acc act gat gtg gat gtt tat 739 Arg Phe Gly Glu Ile Val Ala Leu Arg Thr Thr Asp Val Asp Val Tyr ttt gat cgc agc gga ttt gta gat tgt gtt cga ata agg att tct cgg 787 Phe Asp Arg Ser Gly Phe Val Asp Cys Val Arg Ile Arg Ile Ser Arg age att agg cae aeg aga tae eat gge ega gtt gaa ggt eeg eet aaa 835

Ser Ile Arg His Thr Arg Tyr His Gly Arg Val Glu Gly Pro Pro Lys

230	2.	35	240	245
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gaa att gco Glu Ile Ala	c aag cat gt a Lys His Va 265	l Asp Thr I	tt gat gtg ggt le Asp Val Gly 70	ttg cga cta tgg 931 Leu Arg Leu Trp 275
agc tcg ato Ser Ser Met 280	t Arg Asp Pr	t gat gaa co o Asp Glu P: 285	cc atg ccg tat ro Met Pro Tyr	cac acc ttt aag 979 His Thr Phe Lys 290
cac aac tgo His Asn Trp 295	g gat agg go o Asp Arg Al	g cgg gaa ad a Arg Glu Se 300	gt gtc cac agt er Val His Ser 305	aaa gcg acc gtt 1027 Lys Ala Thr Val
cac tcg ato His Ser Met 310	g agg cat ta E Arg His Ty 31	r Ser Gly Th	eg aag tat gca nr Lys Tyr Ala 320	cag gtt ggg gcg 1075 Gln Val Gly Ala 325
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gca ctg cgt Ala Leu Arg	tat cag ca Tyr Gln Hi 345	c tca ggc ga s Ser Gly Gl 35	lu Arg Asp Glu	gag cta gca aag 1171 Glu Leu Ala Lys 355
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Gly Thr Trp	20 Met Asp Phe		5 g Glu Arg Phe (30 Glu Gln Ala Gln 45
Arg Glu Ala 50	Glu Glu Arc	Met Met Gl 55	u Thr Phe Phe S	er Tyr Ala Ser
Arg Trp Ile 65	Glu Thr Arc	Thr Asn Al	a Gln Gly Lys I 75	ys Leu Ser Gln 80
Gly Val Lys	Asp Asp Tyr 85	Phe Arg Ty	r Ile Lys Ser A 90	sp Arg Leu Ser 95
Tyr Trp Ala	Asp Tyr Ala	Leu Cys Gl	u Ile Thr Val <i>P</i> 5	la Asp Val Arg 110

Glu Trp Tyr Ser Asp Thr Ile Gln Asp Gly Lys Leu Thr Ser Met Ala 115 120 125

Arg Ser Tyr Ser Met Met Lys Ser Val Met Glu Thr Ala Val Glu Asp 130 135 140

Gly Ile Ile Pro Met Asn Pro Cys Lys Val Arg Gly Gly Gly Asn Thr 145 150 155 160

Lys Thr Gly Lys Lys Val Asp Val Pro Thr Asp Ala Glu Leu Glu Ala 165 170 175

Ile Ile Gly Ala Leu Pro Ser Lys Tyr Phe Cys Leu Ala Ile Val Ala 180 185 190

Ala Ala Gly Ala Leu Arg Phe Gly Glu Ile Val Ala Leu Arg Thr Thr 195 200 205

Asp Val Asp Val Tyr Phe Asp Arg Ser Gly Phe Val Asp Cys Val Arg 210 215 220

Ile Arg Ile Ser Arg Ser Ile Arg His Thr Arg Tyr His Gly Arg Val 225 230 235 240

Glu Gly Pro Pro Lys Thr Glu Ala Gly Val Arg Ser Leu Tyr Ile Tyr 245 250 255

Gly Lys Asp Ala Ala Glu Ile Ala Lys His Val Asp Thr Ile Asp Val 260 265 270

Gly Leu Arg Leu Trp Ser Ser Met Arg Asp Pro Asp Glu Pro Met Pro 275 280 285

Tyr His Thr Phe Lys His Asn Trp Asp Arg Ala Arg Glu Ser Val His 290 295 300

Ser Lys Ala Thr Val His Ser Met Arg His Tyr Ser Gly Thr Lys Tyr 305 310 315 320

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	ggt Gly															931
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His	Leu	Pro 115	Asp	Thr	Leu	Ser	Ile 120	Asn	Glu	Val	Ala	Leu 125	Leu	Ile	Asp	
Ala	Ile 130	Pro	His	Ser	Asp	Ile 135	Ala	Thr	Pro	Val	Asp 140	Leu	Arg	Asp	Arg	
Ala 145	Leu	Val	Glu	Leu	Leu 150	Tyr	Gly	Thr	Gly	Ala 155	Arg	Ile	Ser	Glu	Ala 160	
Ile	Gly	Leu	Ala	Val	Asp	Asp	Val	Ser	Glu	Met	Pro	Glu	Val	Leu	Arg	

165 170 Ile Thr Gly Lys Gly Ser Lys Gln Arg Ile Val Pro Phe Gly Ser Met 185 Ala Gln Gln Ala Val Arg Glu Tyr Leu Val Arg Ala Arg Pro Ala Leu Ser Lys Gly Lys Ser His Ala Leu Phe Leu Asn Gln Arg Gly Gly Pro 215 Leu Ser Arg Gln Ser Ala Trp Ala Val Leu Lys Lys Thr Val Glu Arg 230 235 Ala Gly Leu Asp Lys Asp Ile Ser Pro His Thr Leu Arg His Ser Phe 245 250 Ala Thr His Leu Leu Glu Gly Gly Ala Asp Val Arg Val Val Gln Glu 260 Leu Leu Gly His Ser Ser Val Thr Thr Thr Gln Ile Tyr Thr His Ile Thr Ala Asp Ser Leu Arg Glu Val Trp Arg Gly Ala His Pro Arg Ala 295 <210> 177 <211> 339 <212> DNA <213> Corynebacterium glutamicum <220> <221> CDS <222> (101)..(316) <223> RXA01228 <400> 177 catgtccctc gtaccaatag ttgttcctgg cctgtcattg tgatggtcga aggtcgacct 60 gcagaagatc attgaccaaa tcaccaccaa gggtgcgagc gtg cac ttc atc aag Val His Phe Ile Lys gaa aac ctg atc ttc tcg gcg gaa tcc aat gct ttg cgg gcc cag ctc 163 Glu Asn Leu Ile Phe Ser Ala Glu Ser Asn Ala Leu Arg Ala Gln Leu atg ctg age att ctc ggc tcc ttc gct gag ttc gaa cgc tcc atc atc 211 Met Leu Ser Ile Leu Gly Ser Phe Ala Glu Phe Glu Arg Ser Ile Ile 30 cgg gag cgc caa gcc gag ggg atc gcc tgg cga aaa agg ccg gca agt 259 Arg Glu Arg Gln Ala Glu Gly Ile Ala Trp Arg Lys Arg Pro Ala Ser 45 aca agg gcc gca aac gcg ccc tca ccc cgg acg acg tcg aga aag ccc 307 Thr Arg Ala Ala Asn Ala Pro Ser Pro Arg Thr Thr Ser Arg Lys Pro

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65

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					aag Lys											931
					cgt Arg											979
					acc Thr											1027

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	ctt Leu						_									1123
	aat Asn	_	-	-	-	_	_		_					_	-	1171
	cgg Arg															1219
_	ttg Leu 375			_			_	-	_				_	_		1267
	tcc Ser															1315
_	GJÀ ààà		_				-		-					-		1363
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Thr Ala Ser Pro Val Val Leu Gly Asp Asp Leu Trp Gly Phe Met Phe 65 70 75 80

Val Cys Trp Ser Ile Gly Thr Ala Val Gly Leu Val Ala Tyr Ser Leu 85 90 95

Tyr Ile Thr Ala Ile Leu Arg Ser Lys Ala Gly Thr Pro Thr Phe Ala 100 105 110

Trp Gly Leu Pro Leu Val Thr Pro Met Val Ala Ser Thr Ser Ala Ala 115 120 125

Gln Leu His Glu His Phe Glu Leu Pro Ala Met Leu Trp Val Ser Phe 130 135 140

Gly Leu Phe Leu Leu Thr Leu Ala Ser Ala Pro Ala Val Phe Thr Arg 145 150 155 160

Val Tyr Phe Tyr Tyr Phe Gly Pro Lys Ala Gln Gly Ile Pro Leu Met 165 170 175

Ala Thr Pro Thr Ser Trp Ile Pro Leu Gly Met Val Gly Gln Ser Thr 180 185 190

Ala Ala Gln Leu Ile Gly Ala Ser Phe Gly Ser Lys Thr Ala Ile 195 200 205

Thr Met Gly Ile Ile Tyr Gly Ile Ile Met Gly Ile Phe Thr Ile Pro 210 215 220

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Lys Thr Lys Thr Val Phe Pro Asp Leu Val Gly Arg Lys Phe Thr Ala 115 120 125

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                                             Met Ser Ile Ala Ala
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Thr Ala Lys Ala Leu Gly Leu Gly Trp Asp Leu Thr Cys Gln Leu Ala
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tgg Trp	ttg Leu	agt Ser	aag Lys 105	aaa Lys	aaģ Lys	caa Gln	agc Ser	gtc Val 110	ttg Leu	atg Met	agt Ser	tgt Cys	tta Leu 115	gct Ala	ttg Leu	451
ata Ile	aag Lys	act Thr 120	acg Thr	cgg Arg	cac His	tgc Cys	aac Asn 125	tgat	gtgg	jca <u>c</u>	gggt	atca	ia go	gc		498

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Gly Pro Val Glu Ala Ile Asn Gly Arg Leu Glu His Leu Arg Gly Ile 55 60 gcc cta gga ttt cgc aac ctc aac cac tac atc ctg cac tgt ctc atc Ala Leu Gly Phe Arg Asn Leu Asn His Tyr Ile Leu His Cys Leu Ile 75 cac tee gga caa etc ace cae aaa ate aac gea etc taaaacegga 401 His Ser Gly Gln Leu Thr His Lys Ile Asn Ala Leu agagcccgat tgc 414 <210> 206 <211> 97 <212> PRT <213> Corynebacterium glutamicum <400> 206 Met Ala Asp Lys Arg Arg Ala Lys Thr Met Met Arg Glu Ile Val Asp Gln Met Arg Leu Leu Lys Gly Gln Ala Asn Arg Glu Leu Ala Gln Leu 20 Gly Arg Ser Leu His Lys Arg Leu Gly Asp Ile Leu Ala Tyr Phe Asp Val Gly Ile Ser Asn Gly Pro Val Glu Ala Ile Asn Gly Arg Leu Glu His Leu Arg Gly Ile Ala Leu Gly Phe Arg Asn Leu Asn His Tyr Ile 70 Leu His Cys Leu Ile His Ser Gly Gln Leu Thr His Lys Ile Asn Ala 85 Leu <210> 207 <211> 954 <212> DNA <213> Corynebacterium glutamicum <220> <221> CDS <222> (101)..(931) <223> RXA01443 <400> 207 gaaagctgct aaatatttcc cggcaagaga caaactggtg agctgcttcc ggtttgttga 60 cgacgtgcga aaaacctatc cggttaagcg gttatgcgaa gtg ttg aaa atc aac Val Leu Lys Ile Asn cgc tcc tcg tac tac aaa tgg aaa aag act gcc ccg acc agg agc aac

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15 20

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		gat Asp														307
		gca Ala														355
		acc Thr														403
		cat His														451
		tac Tyr 120														499
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		cgc Arg														595
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		acc Thr	_	_			~	_		_		_		,	_	691
		tcg Ser 200														739
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		gcc Ala														835
		tac Tyr														883

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Lys Arg Val Ala Arg Ile Met Ala Ser Leu Lys Leu Phe Gly Phe Thr 65 70 75 80

Lys Lys Arg Arg Val Ile Thr Thr Val Ser Asp Lys Lys Lys Pro Val 85 90 95

Phe Pro Asp Leu Val Lys Arg His Phe Asn Ala Leu Ala Asn Glu 100 105 110

Val Tyr Val Gly Asp Ile Thr Tyr Leu Pro Ile Ala Asp Gly Thr Asn 115 120 125

Met Tyr Leu Ala Thr Val Ile Asp Cys Tyr Ser Arg Arg Leu Val Gly 130 135 140

Phe Ala Ile Ala Asp His Met Arg Thr Ser Leu Val Gln Glu Ala Leu 145 150 155 160

Leu Met Ala Lys Ser Gln Arg Gly Ser Leu Lys Gly Ala Val Phe His 165 170 175

Ser Asp His Gly Ser Val Tyr Thr Ser Gln Ala Phe Gln Asp Thr Cys 180 185 190

Lys Lys Leu Gly Val Arg Gln Ser Met Gly Ala Val Gly Thr Ser Ala 195 200 205

Asp Asn Ser Leu Ala Glu Ser Phe Asn Ala Ala Leu Lys Arg Glu Val 210 215 220

Leu Gln Asp Ser Lys Thr Phe Ala Asn Gln Leu Val Cys Arg Arg Glu 225 230 235 240

Val Phe Arg Trp Cys Thr Arg Tyr Ser Thr Asn Arg Arg His Ser Trp 245 250 255

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Asp Gly Ala Ser Leu Gln Gln Ile Ala Asn Asp Leu Gly Ile Asn Arg
25 30 35

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492

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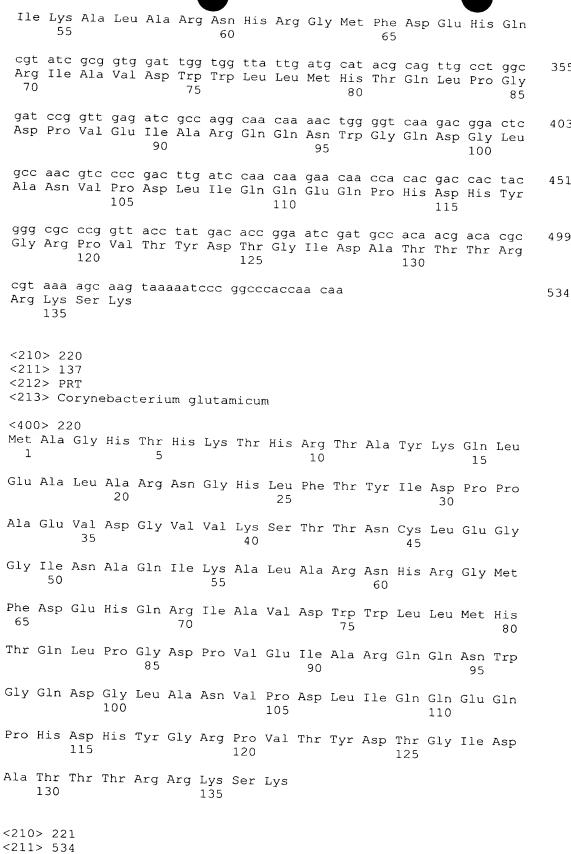
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                                             Met Ser Glu Ala Glu
caa atc aga cag cta aag aag gaa aac gca cta ctg cgt gaa gaa cgc
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Gln Ile Arg Gln Leu Lys Lys Glu Asn Ala Leu Leu Arg Glu Glu Arg
gac att ttg cgc aag gct gct aaa tat ttt ccc ggc aag agg caa gac
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499



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Leu Glu Phe Tyr Leu Ser Pro Lys Arg Asn Val Ala Ala Lys Arg

75

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	aag Lys															499
	tac Tyr 135															547
	ctg Leu		_	_						_			_			595
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Pro Lys Arg Asn Val Ala Ala Ala Lys Arg Phe Leu Ala Lys Thr Leu
65 70 75 80

cga tcg aat acg aca gcc ggg tcc ccg cgg gtc atc aac acc gac aag 288 Arg Ser Asn Thr Thr Ala Gly Ser Pro Arg Val Ile Asn Thr Asp Lys

gca cca gct ctg gcc aag gca ata tcc gag ctg aag gcg gag gga atc 336
Ala Pro Ala Leu Ala Lys Ala Ile Ser Glu Leu Lys Ala Glu Gly Ile
100 105 110

tgc cct cag acg gtg gag cac cgg cag gtg aaa tac ctc aac aac gtt 384
Cys Pro Gln Thr Val Glu His Arg Gln Val Lys Tyr Leu Asn Asn Val
115 120 125

atc gag gga gat cat ggc cga ctt aaa aga atc ctg ggg ccg aag gga 432 Ile Glu Gly Asp His Gly Arg Leu Lys Arg Ile Leu Gly Pro Lys Gly

572

130 135 140 gcg ttc aaa aac cga att tcc gcc tac cgg acg ttg aaa ggg atg gaa Ala Phe Lys Asn Arg Ile Ser Ala Tyr Arg Thr Leu Lys Gly Met Glu gcg atg cat tca tta cgg aaa ggc cag ggc acg atg ttt gac ctc acg Ala Met His Ser Leu Arg Lys Gly Gln Gly Thr Met Phe Asp Leu Thr ggc acc cga acc cag acg cgg tgatcgtcag ccggatattc gag Gly Thr Arg Thr Gln Thr Arg 180 <210> 226 <211> 183 <212> PRT <213> Corynebacterium glutamicum <400> 226 Thr Thr Ile Tyr Arg Trp Val Gln Lys Tyr Ala Leu Glu Leu Asp Lys Gln Thr Arg Trp Tyr Arg Gln Val Pro Asp Trp Gln Ala Ser Ser Trp Arg Val Asp Glu Thr Tyr Ile Arg Val Gly Gly Thr Trp Cys Tyr Leu 35 Tyr Arg Ala Ile Thr Ala Gly Gly Gln Thr Leu Glu Phe Tyr Leu Ser Pro Lys Arg Asn Val Ala Ala Ala Lys Arg Phe Leu Ala Lys Thr Leu Arg Ser Asn Thr Thr Ala Gly Ser Pro Arg Val Ile Asn Thr Asp Lys Ala Pro Ala Leu Ala Lys Ala Ile Ser Glu Leu Lys Ala Glu Gly Ile 100 Cys Pro Gln Thr Val Glu His Arg Gln Val Lys Tyr Leu Asn Asn Val Ile Glu Gly Asp His Gly Arg Leu Lys Arg Ile Leu Gly Pro Lys Gly 135 Ala Phe Lys Asn Arg Ile Ser Ala Tyr Arg Thr Leu Lys Gly Met Glu

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Gly Thr Arg Thr Gln Thr Arg 180

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cgg Arg	ctg Leu	gca Ala 200	gct Ala	ttc Phe	gca Ala	cgt Arg	ggt Gly 205	cac His	agg Arg	gca Ala	cgt Arg	aat Asn 210	cct Pro	gag Glu	cca Pro	739
gtt Val	atc Ile 215	gat Asp	gcc Ala	atg Met	ctt Leu	gct Ala 220	gcg Ala	atc Ile	cac His	ggc Gly	cag Gln 225	acg Thr	gta Val	tcc Ser	atc Ile	787
gcc Ala 230	ggc	gca Ala	gaa Glu	tac Tyr	gcg Ala 235	gaa Glu	ctt Leu	ggc Gly	gta Val	gca Ala 240	atg Met	tcc Ser	gcc Ala	aaa Lys	gat Asp 245	835
gca Ala	cta Leu	gcc Ala	aag Lys	ctg Leu 250	gag Glu	cac His	cgc Arg	aaa Lys	gag Glu 255	att Ile	gaa Glu	ggc Gly	cag Gln	gta Val 260	ctc Leu	883
gag Glu	ctg Leu	atc Ile	cag Gln 265	gac Asp	att Ile	cct Pro	cag Gln	acc Thr 270	gag Glu	att Ile	ctc Leu	ttg Leu	tcc Ser 275	atg Met	ccc Pro	931
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atg Met	tcc Ser 295	gac Asp	ttt Phe	ccc Pro	gat Asp	gca Ala 300	gcg Ala	cac His	ctg Leu	gcg Ala	tcc Ser 305	tat Tyr	gca Ala	ggc Gly	ctg Leu	1027
tcg Ser 310	ccg Pro	cag Gln	aca Thr	aat Asn	cag Gln 315	tcg Ser	gga Gly	acg Thr	tcg Ser	atc Ile 320	atg Met	tcg Ser	aat Asn	tcg Ser	ccc Pro 325	1075
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cgc Arg	cga Arg 375	cgc Arg	ctc Leu	aac Asn	gtc Val	ctc Leu 380	ttc Phe	gcc Ala	atg Met	atg Met	cgc Arg 385	agc Ser	gga Gly	gag Glu	ctc Leu	1267
tac Tyr 390	aga Arg	gac Asp	atc Ile	ccc Pro	aca Thr 395	gcc Ala	cag Gln	gag Glu	gcc Ala	gca Ala 400	gcg Ala	gcc Ala	tago	ccct	ac	1316
aago	cccg	aa g	cc													1329

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<211> 402

<212> PRT

<213> Corynebacterium glutamicum

<400> 228

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Ile Asn Gln His Glu Gly Ser Leu Arg Lys Leu Phe Asp Lys Phe Leu 35 40 45

Ala Asn Asp Ala Glu Val Leu Val Val Val Asp Gln Pro Asn Asn Ile 50 55 60

Gly Arg Leu Thr Val Ala Val Ala Gln Ala Met Gly Ala Asp Val Arg 65 70 75 80

Tyr Leu Pro Gly Leu Ala Met Arg Gln Leu Ser Arg Ile His Val Gly
85 90 95

Asn Ser Lys Thr Asp Val Arg Asp Ala Tyr Val Ile Ala His Ala Gly
100 105 110

Leu Asn Leu Pro Asp Ala Leu Arg Ser Val Asp Arg Val Glu Glu Val 115 120 125

Phe Leu Gln Leu Lys Val Leu Asn Gly Ile Asp Glu Asp Leu Ala Arg 130 135 140

Ala Tyr Thr Arg Leu Ile Asn Gln Met Gln Ser Ala Leu Val Gly Thr 145 150 155 160

Tyr Pro Ala Phe Glu His Val Leu Arg Gly Gln Met Ile His Arg Lys 165 170 175

Trp Ile Leu His Leu Leu Ala Lys Tyr Gly Gly Pro Thr Lys Ile Arg 180 185 190

Arg Val Gly Lys Ala Arg Leu Ala Ala Phe Ala Arg Gly His Arg Ala 195 200 205

Arg Asn Pro Glu Pro Val Ile Asp Ala Met Leu Ala Ala Ile His Gly 210 215 220

Gln Thr Val Ser Ile Ala Gly Ala Glu Tyr Ala Glu Leu Gly Val Ala 225 230 235 240

Met Ser Ala Lys Asp Ala Leu Ala Lys Leu Glu His Arg Lys Glu Ile 245 250 255

Glu Gly Gln Val Leu Glu Leu Ile Gln Asp Ile Pro Gln Thr Glu Ile 260 265 270

Leu Leu Ser Met Pro Gly Ile Gly Pro Arg Ser Ala Ala Gln Ile Leu 275 280 285

Met Thr Val Gly Asp Met Ser Asp Phe Pro Asp Ala Ala His Leu Ala 290 295 300

Ser Tyr Ala Gly Leu Ser Pro Gln Thr Asn Gln Ser Gly Thr Ser Ile 305 310 315 320

Met Ser Asn Ser Pro Asn Arg Ala Gly Asn Lys Lys Leu Lys Asn Ala Leu Trp Gln Ser Ser Phe Ala Ser Ile Arg Phe His Glu Arg Ser Arg 345 Gln Phe Tyr Glu Arg Lys Arg Asn Glu Gly Lys Arg His Asn Ala Ala Val Val Ala Leu Ala Arg Arg Arg Leu Asn Val Leu Phe Ala Met Met 375 Arg Ser Gly Glu Leu Tyr Arg Asp Ile Pro Thr Ala Gln Glu Ala Ala 390 395 Ala Ala <210> 229 <211> 504 <212> DNA <213> Corynebacterium glutamicum <220> <221> CDS <222> (101)..(481) <223> RXA01953 <400> 229 gcatatcagc agcagtatgg attagcagca gcgtaagaag aaaaatcaat caagctgtct 60 caaaaacttg acgagcgcaa cctgggggat ctaccagcgg atg atc gcg gcc tac 115 Met Ile Ala Ala Tyr ege gag aag gae ega tee ete gge ege geg geg atg gag geg ete ate 163 Arg Glu Lys Asp Arg Ser Leu Gly Arg Ala Ala Met Glu Ala Leu Ile 10 gac gcc gtc agc caa gac gtc ccc gcc ggg ctg gac gag ttg cgc aag 211 Asp Ala Val Ser Gln Asp Val Pro Ala Gly Leu Asp Glu Leu Arg Lys ctc ggt cgg acc ctg aag gct cgc gcc acc gac gtg ctg gcc tac ttc 259 Leu Gly Arg Thr Leu Lys Ala Arg Ala Thr Asp Val Leu Ala Tyr Phe gag egg eet gge ace age aat gge eee aca gag geg ate aac gga ege 307 Glu Arg Pro Gly Thr Ser Asn Gly Pro Thr Glu Ala Ile Asn Gly Arg 55 ctg gag cac ctg cgc ggc tcg gcc ctg ggc ttc cgc aac ctg acc aac 355 Leu Glu His Leu Arg Gly Ser Ala Leu Gly Phe Arg Asn Leu Thr Asn 75

tac atc gcc aga tcc ctg ctc gag ttc cgg cgg att cag acc tca act

Tyr Ile Ala Arg Ser Leu Leu Glu Phe Arg Arg Ile Gln Thr Ser Thr

aca ccc tca tct gtg aag agc cgc ttt aga cat ccc tca tcg tca cgg

90

403

451

Thr Pro Ser Ser Val Lys Ser Arg Phe Arg His Pro Ser Ser Ser Arg 110 acc act atg aac gat gtc ccg act cac cta tgaacgatgt cctgaaccta 501 Thr Thr Met Asn Asp Val Pro Thr His Leu cac 504 <210> 230 <211> 127 <212> PRT <213> Corynebacterium glutamicum <400> 230 Met Ile Ala Ala Tyr Arg Glu Lys Asp Arg Ser Leu Gly Arg Ala Ala Met Glu Ala Leu Ile Asp Ala Val Ser Gln Asp Val Pro Ala Gly Leu 20 Asp Glu Leu Arg Lys Leu Gly Arg Thr Leu Lys Ala Arg Ala Thr Asp Val Leu Ala Tyr Phe Glu Arg Pro Gly Thr Ser Asn Gly Pro Thr Glu 50 Ala Ile Asn Gly Arg Leu Glu His Leu Arg Gly Ser Ala Leu Gly Phe Arg Asn Leu Thr Asn Tyr Ile Ala Arg Ser Leu Leu Glu Phe Arg Arg 85 Ile Gln Thr Ser Thr Thr Pro Ser Ser Val Lys Ser Arg Phe Arg His 100 105 Pro Ser Ser Ser Arg Thr Thr Met Asn Asp Val Pro Thr His Leu 115 120 <210> 231 <211> 831 <212> DNA <213> Corynebacterium glutamicum <220> <221> CDS <222> (101)..(808) <223> RXA01998 <400> 231 aaccatcatc ttggagttca gggtcacctg caggataacc taaaacggtg ctgttgcaaa 60 gttggggcag taggaagacc ggcgtggaat aatcaggtcc atg ggc atc ttc tcc Met Gly Ile Phe Ser ggt cgg cag ttc cct cgt gaa atc atc ctg tgg gcg gtg cgg tgg tac

Gly Arg Gln Phe Pro Arg Glu Ile Ile Leu Trp Ala Val Arg Trp Tyr

15

10

tgc cgc Cys Arg	tac ggc Tyr Gly 25	var se	c tat r Tyr	cgc Arg	gac Asp 30	ctc Leu	gaa Glu	gag Glu	atg Met	atg Met 35	Thr	gag Glu	211
cgg gga Arg Gly	gtg ccg Val Pro 40	gtc ga Val As	t cac p His	acc Thr 45	acg Thr	atc Ile	tac Tyr	cgc Arg	tgg Trp 50	gtc Val	cag Gln	aaa Lys	259
tat gct Tyr Ala : 55	cct gag Pro Glu	ctg ga Leu As	t aag p Lys 60	aag Lys	acc Thr	cgg Arg	tgg Trp	tat Tyr 65	cgg Arg	caa Gln	gtt Val	cct Pro	307
gac tgg (Asp Trp (70	cag gcc Gln Ala	agg tco Arg Ser 75	rirp	cgg Arg	gtg Val	gat Asp	gag Glu 80	acc Thr	tat Tyr	atc Ile	cgg Arg	gtc Val 85	355
ggg gga a Gly Gly I	aag tgg Lys Trp	tgc tac Cys Tyr 90	ctc Leu	tat Tyr .	cgg Arg	gca Ala 95	atc Ile	acc Thr	gcc Ala	ggt Gly	agc Ser 100	cag Gln	403
acc ctg g Thr Leu A	sp Phe 105	tac ctc Tyr Leu	tcc Ser	Pro .	aag Lys 110	aga Arg	aac Asn	gtc Val	Ala	gcg Ala 115	gcg Ala	aag Lys	451
cgt ttc c Arg Phe L 1	tg gcg eu Ala 20	aag acg Lys Thr	Leu A	cgg t Arg S 125	tcg Ser 1	aat Asn	aaa Lys	Ser 1	gca Ala 130	ggc ggc	tat Tyr	ccg Pro	499
cgg gtg a Arg Val I 135	tc agc le Ser	acc gac Thr Asp	aag q Lys <i>F</i> 140	gcc o Ala E	ccc f Pro S	tca (Ser :	Leu A	gcc a Ala <i>l</i> 145	agg (Arg)	gca Ala	atc Ile	tct Ser	547
gag ctg a Glu Leu L 150	yo mia	155	val (ys F	ro S	ser :	Thr \ 160	Val (Glu I	His.	Arg	Arg 165	595
gtg aaa ta Val Lys T	y - Dea 1	aac aac Asn Asn 170	gtc a Val I	att g [le G	ııu (ggc q Sly A .75	gac d Asp H	cat q His (ggt d Sly A	Arg :	tta Leu 180	aag Lys	643
cgg atc ct Arg Ile Le	eu Gly 1 185	ccg aaa Pro Lys	ggc g Gly A	Ma P	tc a he I 90	aaa a .ys <i>P</i>	aac d Asn <i>P</i>	ega a Arg T	hr S	ct o Ser 1	gcc Ala	tac Tyr	691
cgg acg tt Arg Thr Le 20	La Llys (ggg atg Gly Met	GIU A	icg a la M 05	tg c et H	ac t is S	ca t Ger L	eu A	gg a rg L 10	ıag (gly ggg	cag Gln	739
ggc acg at Gly Thr Me 215	g ttt o	gcc tat Ala Tyr	ggt c Gly H 220	ac c is P	cg a ro A	at c sn P	ro A	at g sp A 25	ca g la V	tg a al 1	att ([le '	gtt Val	787
agc cgg gt Ser Arg Va 230	a ttc g l Phe G	gag acg Glu Thr 235	gcc to Ala	gacaa	acac	a gg	caca	tagc	gtt				831

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<400> 232

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Glu Met Met Thr Glu Arg Gly Val Pro Val Asp His Thr Thr Ile Tyr 35 40 45

Arg Trp Val Gln Lys Tyr Ala Pro Glu Leu Asp Lys Lys Thr Arg Trp 50 55 60

Tyr Arg Gln Val Pro Asp Trp Gln Ala Arg Ser Trp Arg Val Asp Glu 65 70 75 80

Thr Tyr Ile Arg Val Gly Gly Lys Trp Cys Tyr Leu Tyr Arg Ala Ile 85 90 95

Thr Ala Gly Ser Gln Thr Leu Asp Phe Tyr Leu Ser Pro Lys Arg Asn 100 105 110

Val Ala Ala Lys Arg Phe Leu Ala Lys Thr Leu Arg Ser Asn Lys 115 120 125

Ser Ala Gly Tyr Pro Arg Val Ile Ser Thr Asp Lys Ala Pro Ser Leu 130 135 140

Ala Arg Ala Ile Ser Glu Leu Lys Ala Glu Gly Val Cys Pro Ser Thr 145 150 155 160

Val Glu His Arg Arg Val Lys Tyr Leu Asn Asn Val Ile Glu Gly Asp 165 170 175

His Gly Arg Leu Lys Arg Ile Leu Gly Pro Lys Gly Ala Phe Lys Asn 180 185 190

Arg Thr Ser Ala Tyr Arg Thr Leu Lys Gly Met Glu Ala Met His Ser 195 200 205

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Asp Ala Val Ile Val Ser Arg Val Phe Glu Thr Ala 225 230 235

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<211> 274

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cat His	get Ala	gtg Val	acc Thr	gat Asp 10	Ala	g acg	. Glà 1 aad	g cgt Æ Arg	cca Pro	Ile	cgc Arg	ttc Phe	ttc Phe	atç Met 20	acc Thr	163
gcc Ala	gga Gly	aag Lys	gtc Val 25	Ser	gac Asp	tac Tyr	atc	gga Gly 30	Ala	atg Met	gct Ala	ttg Leu	cta Leu 35	ggc	agc Ser	211
ctg Leu	Pro	aag Lys 40	gcc Ala	Gly	tgg Trp	ctt Leu	cta Leu 45	Ala	gat Asp	cgg Arg	ggc Gly	tat Tyr 50	gac Asp	gcg Ala	gac Asp	259
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	0> 23															
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Ala	Leu	Leu 35	Gly	Ser	Leu	Pro	Lys 40	Ala	Gly	Trp	Leu	Leu 45	Ala	Asp	Arg	
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ccc Pro	gaa (Glu (ggg (tgc (Cys (gaa Glu 10	gtg Val	ggc Gly	att i	cgt Arg .	aga a Arg '	aca a Thr 1	atc (Ile :	cca (Pro (gag (Glu (gaa Glu	agc Ser	163

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gcg Ala	tct Ser	aca Thr 40	gcg Ala	gtc Val	Gly	gtc Val	agt Ser 45	gaa Glu	ttc Phe	acc Thr	ggg Gly	cga Arg 50	aag Lys	tgg Trp	gcg Ala	259
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ccg Pro	gtg Val 135	atg Met	ggc Gly	cct Pro	tat Tyr	tat Tyr 140	Gly ggg	cca Pro	cgc Arg	aca Thr	ctc Leu 145	cat His	caa Gln	gtg Val	ttg Leu	547
cgt Arg 150	gag Glu	gac Asp	tac Tyr	aca Thr	aca Thr 155	ctg Leu	ttt Phe	gac Asp	gag Glu	tta Leu 160	tct Ser	gcg Ala	ttg Leu	Gly	ttg Leu 165	595
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tta Leu	cgc Arg	ttt Phe	tct Ser 185	tat Tyr	atg Met	tcg Ser	tgt Cys	gta Val 190	gtg Val	ccg Pro	tta Leu	ttt Phe	gct Ala 195	gat Asp	gaa Glu	691
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cga Arg 230	cgc Arg	ctg Leu	ggt Gly	cgg Arg	tgt Cys 235	cgg Arg	caa Gln	aca Thr	att Ile	tcc Ser 240	agg Arg	gaa Glu	ctt Leu	cga Arg	cgt Arg 245	835
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acc	r ato		Y 22:	a ata	~~~											
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ggt Gly	aaa Lys	GJ A aaa	gcg Ala	ttg Leu 330	cgt Arg	gat Asp	gaa Glu	ttg Leu	aag Lys 335	gtg Val	gag Glu	aaa Lys	ttt Phe	ctt Leu 340	Arg	1123
acc Thr	ggt Gly	cgg Arg	aag Lys 345	gga Gly	cgt Arg	aaa Lys	ccg Pro	cag Gln 350	tcg Ser	aag Lys	ttg Leu	cca Pro	tcg Ser 355	aga Arg	ggt Gly	1171
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cgg Arg	ttg Leu	acg Thr	ttg Leu	att Ile 410	aag Lys	cgg Arg	ttg Leu	gly ggg	gtt Val 415	aat Asn	cat His	gag Glu	gcg Ala	tcg Ser 420	act Thr	1363
gtg Val	acg Thr	gat Asp	gcg Ala 425	ttg Leu	gtg Val	gag Glu	atg Met	atg Met 430	ggt Gly	gat Asp	ttg Leu	ccg Pro	cag Gln 435	gcg Ala	ttg Leu	1411
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cgg Arg	ttt Phe 455	agc Ser	gtg Val	gtg Val	acc Thr	aag Lys 460	tgt Cys	ccg Pro	gtg Val	ttt Phe	ttc Phe 465	tgt Cys	gat Asp	cct Pro	cat His	1507
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gat Asp	ttt Phe	ttc Phe	ccg Pro	aag Lys 490	ggc Gly	act Thr	aat Asn	Phe	gct Ala 495	aaa Lys	gta Val	agt Ser	gac Asp	gaa Glu 500	gaa Glu	1603
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Val Gln Arg Ala Gln Asp Leu Leu Asn Tyr Arg Pro Arg Lys Met His 505 510 515

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Gly Arg Lys Trp Ala Lys Ala Ala Gly Val Lys Leu Thr Arg Gly Pro 50 55 60

Arg Gly Gly Asn Ala Phe Asp Thr Ala Glu Lys Leu Glu Ile Ala Ala 65 70 75 80

Ser Met Leu Glu Lys Gly Cys Leu Pro Arg Glu Ile Gly Glu Tyr Val 85 90 95

Gly Met Thr Arg Ala Asn Ile Ser Leu Trp Arg Lys Gln Gly Pro Asp 100 105 110

Lys Leu Arg Gln Arg Ala Ala Thr Leu Arg Thr Gly Lys Arg Ala Ala 115 120 125

Glu Phe Ile His Ala Pro Val Met Gly Pro Tyr Tyr Gly Pro Arg Thr 130 135 140

Leu His Gln Val Leu Arg Glu Asp Tyr Thr Thr Leu Phe Asp Glu Leu 145 150 155 160

Ser Ala Leu Gly Leu Pro Ala Gln Val Cys Gly Ala Leu Leu His Leu 165 170 175

Ala Pro Pro Pro Ser Leu Arg Phe Ser Tyr Met Ser Cys Val Val Pro 180 185 190

Leu Phe Ala Asp Glu Ile Lys Val Val Gly Gln Gly Thr Arg Leu Ser 195 200 205

Leu Glu Glu Lys Met Met Ile Gln Arg Phe His Asp Thr Gly Val Ser 210 215 220

Ala Ala Glu Ile Gly Arg Arg Leu Gly Arg Cys Arg Gln Thr Ile Ser

225 230 235 240 Arg Glu Leu Arg Arg Gly Gln Asp Asp Asp Gly Arg Tyr Arg Ala Arg 245 250 Asp Ser Tyr Glu Gly Ala Ile Arg Lys Leu Ala Arg Pro Lys Thr Pro Lys Leu Asp Ala Asn Arg Arg Leu Arg Ala Val Val Glu Ala Leu Asn Asn Lys Leu Ser Pro Glu Gln Ile Ser Gly Leu Leu Ala Thr Glu His Ala Asn Asp Ser Ser Met Gln Ile Ser His Glu Thr Ile Tyr Gln 315 Ala Leu Tyr Val Gln Gly Lys Gly Ala Leu Arg Asp Glu Leu Lys Val Glu Lys Phe Leu Arg Thr Gly Arg Lys Gly Arg Lys Pro Gln Ser Lys Leu Pro Ser Arg Gly Lys Pro Trp Val Glu Gly Ala Leu Ile Ser Gln Arg Pro Ala Glu Val Ala Asp Arg Ala Val Pro Gly His Trp Glu Gly Asp Leu Val Ile Gly Gly Glu Asn Gln Ala Thr Ala Leu Val Thr Leu 385 Val Glu Arg Thr Ser Arg Leu Thr Leu Ile Lys Arg Leu Gly Val Asn His Glu Ala Ser Thr Val Thr Asp Ala Leu Val Glu Met Met Gly Asp 425 Leu Pro Gln Ala Leu Arg Arg Ser Leu Thr Trp Asp Gln Gly Val Glu Met Ala Glu His Ala Arg Phe Ser Val Val Thr Lys Cys Pro Val Phe Phe Cys Asp Pro His Ser Pro Trp Gln Arg Gly Ser Asn Glu Asn Thr Asn Gly Leu Val Arg Asp Phe Phe Pro Lys Gly Thr Asn Phe Ala Lys Val Ser Asp Glu Glu Val Gln Arg Ala Gln Asp Leu Leu Asn Tyr Arg Pro Arg Lys Met His Gly Phe Lys Ser Ala Thr Gln Val Tyr Glu Lys 525 Ile Val Val Gly Ala Ser Thr Asp

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	caa Gln 70	ctt Leu	gaa Glu	aag Lys	gaa Glu	aat Asn 75	gca Ala	ctc Leu	ctc Leu	cgc Arg	gaa Glu 80	gag Glu	cgt Arg	gac Asp	atc Ile	ctg Leu 85	355
The first form the first	cgg Arg	aaa Lys	gcg Ala	gcc Ala	aaa Lys 90	tat Tyr	ttc Phe	gcg Ala	gaa Glu	gag Glu 95	acg Thr	aac Asn	tgg Trp	tga	teeg	ctt	404
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Ile Gly Gly Arg Lys Leu Ala Ala Thr Val Leu	Leu Val Arg Asp Gly
10 15	20
atc atc aat ggg cgt cct gat gtg gag gtt tac	att cag gag cgt gtg 211
Ile Ile Asn Gly Arg Pro Asp Val Glu Val Tyr	Ile Gln Glu Arg Val

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45
50

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Gly Pro Ser Ala Glu Glu Trp Gly Val Arg Leu Gly Val Glu Pro His
70 80 85

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gcc ggt acg ttg ctt gcg gag cat acg gat ggt tct ggt ttg gtg aag 451 Ala Gly Thr Leu Leu Ala Glu His Thr Asp Gly Ser Gly Leu Val Lys 105 110 115

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Met Ser Leu Thr Asp Met Leu Gln Ser Glu Asn Leu Ala Ile Arg Ser
135 140 145

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185

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200 205 210

787

835

883

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gag Glu 230	ı G1u	tto Lev	g ctg 1 Leu	gaq Glu	tac Tyr 235	Ser	gcg Ala	cag Gln	gtt Val	gat Asp 240	atg Met	tct Ser	cct Pro	gtg Val	ttg Leu 245	
gat Asp	gat Asp	gcg Ala	r gtg Val	gat Asp 250	Asn	ccg Pro	agg Arg	tat Tyr	gcg Ala 255	gag Glu	ttt Phe	tat Tyr	cag Gln	gcg Ala 260	Met	
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195

200 205

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Gln Phe Lys Thr Val Glu Glu Leu Leu Glu Tyr Ser Ala Gln Val Asp 225 230 235 240

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Phe Tyr Gln Ala Met Arg Thr Glu Arg Phe 260 265

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Leu Ile Leu Pro Val

1

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Gln Glu Gly Ile Ser Tyr Phe Pro Thr Pro Leu His Leu Asn His Ile
10 15 20

ggt gga tcc agg ttt aag aag ttc ctg gtc aag atc gac aag act gtt 211 Gly Gly Ser Arg Phe Lys Lys Phe Leu Val Lys Ile Asp Lys Thr Val 25 30 35

ccc cag gac ctt gat gtt cat gtt att tgt gac aac tac gcc acg cat $$ 259 Pro Gln Asp Leu Asp Val His Val Ile Cys Asp Asn Tyr Ala Thr His $$ 40 $$ 45 $$ 50

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Lys His Pro Thr Ile Asn Thr Trp Leu Val Lys His Pro Arg Phe His
55 60 65

atg cac ttc acc ccg acg tat tcg tcc tgg atc aac cag gtt gaa cgg
Met His Phe Thr Pro Thr Tyr Ser Ser Trp Ile Asn Gln Val Glu Arg
70 75 80 85

ttg ttc gct gag gtg acc cgg gag tta ctc cag cgt tct gat cat cgg
Leu Phe Ala Glu Val Thr Arg Glu Leu Leu Gln Arg Ser Asp His Arg
90 95

agt gtc cag gcc ctg gag aaa gat tta cgc aac tgg gtg aaa gca tgg 451 Ser Val Gln Ala Leu Glu Lys Asp Leu Arg Asn Trp Val Lys Ala Trp 105 110 115

aac gag gat cct aag ccg ttt atc tgg acc aaa acc gcg gag gag atc 499



Asn Glu Asp Pro Lys Pro Phe Ile Trp Thr Lys Thr Ala Glu Glu Ile 120 125 130

ctt tcc tct atc gcc cga tac tta aaa cga att aac ggc gca gga cac 547 Leu Ser Ser Ile Ala Arg Tyr Leu Lys Arg Ile Asn Gly Ala Gly His 135 140 145

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Ile Asp Lys Thr Val Pro Gln Asp Leu Asp Val His Val Ile Cys Asp 35 40 45

Asn Tyr Ala Thr His Lys His Pro Thr Ile Asn Thr Trp Leu Val Lys 50 55 60

His Pro Arg Phe His Met His Phe Thr Pro Thr Tyr Ser Ser Trp Ile 65 70 75 80

Asn Gln Val Glu Arg Leu Phe Ala Glu Val Thr Arg Glu Leu Leu Gln 85 90 95

Arg Ser Asp His Arg Ser Val Gln Ala Leu Glu Lys Asp Leu Arg Asn 100 105 110

Trp Val Lys Ala Trp Asn Glu Asp Pro Lys Pro Phe Ile Trp Thr Lys
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Asn Gly Ala Gly His 145

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Met Pro Phe Ser His

											меt 1	Pro	Pne	ser	5	
_	aaa Lys		-				-						-		_	163
	cct Pro	-	_	-		_		-		-						211
	gca Ala															259
_	tca Ser 55			_				-	-	_	-	-	_			307
	gtg Val	_	_	_		-	_	_	_	_	_		_	_		355
	ctt Leu	-					_				_				_	403
	aac Asn															451
_	agt Ser		_	-		_	_		_		_		_	-		499
	aaa Lys 135															547
	gct Ala															595
	aaa Lys															643
	agg Arg															691
	gca Ala															739
_	tac Tyr 215		-			_		-	_	_			-	-	-	787
	caa Gln				_	_	_		_			_				835

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879

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Gln Thr Asn Glu Pro Gln Ala Leu Gln Val Ala Asp Ile Gln Pro Phe 35 40 45

His Ala Val Ile Ala Ala Ser Lys Gln Leu Thr Leu Ile Asp Val Val 50 55 60

Asp Val Cys Leu Gly Thr Val Leu Arg Ala Trp Glu Ala Leu Ser Leu 65 70 75 80

Arg Trp Val Asp Val Val Leu Asp Glu Glu His Pro Arg Ile Phe Ile 85 90 95

Arg Gly Thr Ile Val Tyr Asn Lys Glu Lys Gly Asn His Arg Gln Asp 100 105 110

Lys Thr Lys Thr Thr Ser Ser Arg Arg Val Ile Gln Leu Pro Glu Ile 115

Ala Ser Asp Val Leu Arg Lys Arg His Ala Leu Tyr Ala Glu His Leu 130 140

Glu Met Val Phe Pro Ser Ala Arg Gly Thr Tyr Ile Tyr Glu Ser Asn 145 150 155 160

Phe Asn Lys Leu Leu Arg Lys His Arg Lys Gly Thr Ala Tyr Asp Trp
165 170 175

Val Thr Val His Ser Ile Arg Lys Thr Leu Ala Ser Ile Val Ser Glu 180 185 190

Asn Leu Asp Ser Lys Ala Ala Ser Asp Val Leu Gly His Ala Asp Ser 195 200 205

Arg Leu Thr Glu Arg Val Tyr Ile Ala Lys Thr Asp Lys Asp Val Pro 210 215 220

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ccc cca gaa acc Pro Pro Glu Thr						
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cgc agc ttc tac Arg Ser Phe Tyr 40						
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gat gaa too ato Asp Glu Ser Ile 70						
gcc caa gga tgc Ala Gln Gly Trp						
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Thr	Thr	Ile	Tyr	Arg	Trp	Val	Gln	Lys	Tyr	Ala	Pro	Glu	Leu	Asp	Lys	
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5					- 1 -			·ul	O T Y	O T Y	1111	111	C_{Y}	r y r	11 C U	
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	55					60					65		_			

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															Leu	
70					75			_	-	80			-		85	

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Arg																
				90					95					100	-	

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Tyr	Leu 130		Asn	. Val	Ile	e Glu 135		/ Asp	His	Gly	/ Arc		ı Lys	arç	, Ile	
Leu 145		/ Prc	Lys	Gly	Ala 150		e Lys	s Asr	a Arç	11e		Ala	a Tyr	Arç	Thr 160	
Leu	Lys	s Gly	Met	: Glu	n Ala	a Met	His	s Ser	Leu	a Arç	g Lys	s Gly	y Ser	Gly	/ Asn	

175

165 170

Asp Val

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150 155 160 165 gca aca cag cct ggt cag gtg gtg tgt tgg gat gtg acg ttc ttg ccg 643 Ala Thr Gln Pro Gly Gln Val Val Cys Trp Asp Val Thr Phe Leu Pro 170 175 tcg ctg gta cgt ggt aag acc tat gcg ttg cat ctg gcg att gat ttg 691 Ser Leu Val Arg Gly Lys Thr Tyr Ala Leu His Leu Ala Ile Asp Leu 190 ttt tcc cgc aag att gtt ggg gcg aag gtc gcg ccg acg gaa aat acc 739 Phe Ser Arg Lys Ile Val Gly Ala Lys Val Ala Pro Thr Glu Asn Thr 205 tcc acc gcg gtg gag ttg tta acg cag gtg tta gcg gat aat ccg ggt 787 Ser Thr Ala Val Glu Leu Leu Thr Gln Val Leu Ala Asp Asn Pro Gly 215 220 gtg gtg acg gtg cat tcg gat aat ggg tcg gcg atg aca tcg acg agg 835 Val Val Thr Val His Ser Asp Asn Gly Ser Ala Met Thr Ser Thr Arg 235 245 gtg cgg cgg ttg tta gcg gat cat ggt gtg gcg ttg tcg ttg att cgg 883 Val Arg Arg Leu Leu Ala Asp His Gly Val Ala Leu Ser Leu Ile Arg 250 255 ccg cgg gtg agt gat gat aat gcg ttt gtg gag tcg gtg ttt cat acg Pro Arg Val Ser Asp Asp Asn Ala Phe Val Glu Ser Val Phe His Thr 265 270 ttg aag tat cgg ccg ttt tat ccg aag gtg ttt gca tcg atg gat cag 979 Leu Lys Tyr Arg Pro Phe Tyr Pro Lys Val Phe Ala Ser Met Asp Gln 280 285 gcc cgg gtg tgg gtg gag ttt gtg gtg tat tac aac acg gtt cat 1027 Ala Arg Val Trp Val Glu Glu Phe Val Val Tyr Tyr Asn Thr Val His 295 300 ccg cat tot ggt gtg gct ggg cat act ccg cag tcg gtg ttt gat ggt 1075 Pro His Ser Gly Val Ala Gly His Thr Pro Gln Ser Val Phe Asp Gly 310 315 agt tgg agg gcg gct cat agg ttg cgt gtg cag gcg ttg gat gcc cat 1123 Ser Trp Arg Ala Ala His Arg Leu Arg Val Gln Ala Leu Asp Ala His 330 335 tac cgg cag ttc ccg cag cgg tat gtg ggg cgg ccg gtg gtt cag gaa Tyr Arg Gln Phe Pro Gln Arg Tyr Val Gly Arg Pro Val Val Gln Glu 345 gtt gct ggt gtg cgt ctt aat ggt gcg cgt gat gat ggg tct gta Val Ala Gly Val Val Arg Leu Asn Gly Ala Arg Asp Asp Gly Ser Val 360 cag gag agg gtt ggt ggt gta gcg tcg ctg tta agt gct tgagttagca Gln Glu Arg Val Gly Gly Val Ala Ser Leu Leu Ser Ala 375 tgtgttctta tcg 1281

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<212> PRT

<213> Corynebacterium glutamicum

<400> 252

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Leu Arg Leu Ile Lys Leu Ser Lys Ser Thr Ala Tyr Tyr Arg Asn Lys 35 40 45

Pro Arg Pro Arg Pro Ala Pro Lys Pro Val Leu Gln Ala Val Pro Ala 50 55 60

Pro Thr Ala Pro Gly Val Glu Pro Thr Pro Glu Pro Trp Gln Gly Lys
65 70 75 80

Glu Pro Ala Val Ser Ser Val Arg Gln Ala Leu Ala Glu His Glu Arg 85 90 95

Gln Phe Ile Val Asp Ala Ile Thr Ala Tyr Pro Gln Leu Ser Val Ser 100 105 110

Gly Val Phe Asn Met Leu Phe Asn Lys Gly Ile Tyr Arg Ala Ser Leu 115 120 125

Arg Thr Trp Trp Arg Val Ala Lys Gln His Lys Leu Leu His Lys Asp 130 135 140

Arg Val Ser Ala Leu Ser Pro Gly Lys Arg Ser Pro Thr Pro Arg Val 145 150 155 160

Lys Pro Arg Leu Glu Ala Thr Gln Pro Gly Gln Val Val Cys Trp Asp 165 170 175

Val Thr Phe Leu Pro Ser Leu Val Arg Gly Lys Thr Tyr Ala Leu His 180 185 190

Leu Ala Ile Asp Leu Phe Ser Arg Lys Ile Val Gly Ala Lys Val Ala 195 200 205

Pro Thr Glu Asn Thr Ser Thr Ala Val Glu Leu Leu Thr Gln Val Leu 210 215 220

Ala Asp Asn Pro Gly Val Val Thr Val His Ser Asp Asn Gly Ser Ala 225 235 240

Met Thr Ser Thr Arg Val Arg Arg Leu Leu Ala Asp His Gly Val Ala 245 250 255

Leu Ser Leu Ile Arg Pro Arg Val Ser Asp Asp Asn Ala Phe Val Glu 260 265 270

Ser Val Phe His Thr Leu Lys Tyr Arg Pro Phe Tyr Pro Lys Val Phe 275 280 285

Ala Ser Met Asp Gln Ala Arg Val Trp Val Glu Glu Phe Val Val Tyr

290

295 300 Tyr Asn Thr Val His Pro His Ser Gly Val Ala Gly His Thr Pro Gln 310 315 Ser Val Phe Asp Gly Ser Trp Arg Ala Ala His Arg Leu Arg Val Gln 325 Ala Leu Asp Ala His Tyr Arg Gln Phe Pro Gln Arg Tyr Val Gly Arg Pro Val Val Gln Glu Val Ala Gly Val Val Arg Leu Asn Gly Ala Arg Asp Asp Gly Ser Val Gln Glu Arg Val Gly Gly Val Ala Ser Leu Leu 375 380 Ser Ala 385 <210> 253 <211> 1281 <212> DNA <213> Corynebacterium glutamicum <220> <221> CDS <222> (101)..(1258) <223> RXN03035 <400> 253 aagaccatca gaatcaaatg gtgatcgata tcttgggaaa agctattggg accaggccca 60 atcctggcga gggcttagac gaggaggacg ccacctaaac gtg gat gag caa cgc 115 Val Asp Glu Gln Arg 1 gcc ttt gat caa gga ctc aag gaa gaa aac acc ttg atc aca gat ctc 163 Ala Phe Asp Gln Gly Leu Lys Glu Glu Asn Thr Leu Ile Thr Asp Leu 10 ace ace tgt gee agg etg age eat aae aag gea tta egg etg ate aag 211 Thr Thr Cys Ala Arg Leu Ser His Asn Lys Ala Leu Arg Leu Ile Lys 25 ctg tcg aaa tca acg gcg tat tac cgc aac aag ccg cgt ccc cgt cct 259 Leu Ser Lys Ser Thr Ala Tyr Tyr Arg Asn Lys Pro Arg Pro Arg Pro 40 gca ccg aaa cct gtc ctg cag gcc gtg cca gca cca aca gca cct ggt 307 Ala Pro Lys Pro Val Leu Gln Ala Val Pro Ala Pro Thr Ala Pro Gly 55 gtg gaa ccc aca cca gag cct tgg cag ggg aag gag cca gca gtg tcg 355 Val Glu Pro Thr Pro Glu Pro Trp Gln Gly Lys Glu Pro Ala Val Ser tcg gtg cgt caa gcg ttg gca gaa cac gaa cgc cag ttc att gtt gat 403 Ser Val Arg Gln Ala Leu Ala Glu His Glu Arg Gln Phe Ile Val Asp

gcç Ala	ato Ile	acc Thr	geg Ala 105	ı Tyr	cca Pro	caa Gln	ctg Leu	agc Ser 110	Val	agt Ser	Gly	gtg Val	ttt Phe 115	Asn	atg Met	451
ttg Leu	ttt. Phe	aac Asn 120	Lys	ggc	atc Ile	tac Tyr	cgc Arg 125	gca Ala	tca Ser	cta Leu	cgt Arg	aca Thr 130	tgg Trp	tgg Trp	cgt Arg	.499
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tcc Ser 150	Pro	GJÀ aaa	aaa Lys	cga Arg	tca Ser 155	cca Pro	acg Thr	cca Pro	cgg Arg	gtt Val 160	aag Lys	ccg Pro	agg Arg	ttg Leu	gaa Glu 165	595
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ccg Pro	cgg Arg	gtg Val	agt Ser 265	gat Asp	gat Asp	aat Asn	gcg Ala	ttt Phe 270	gtg Val	gag Glu	tcg Ser	gtg Val	ttt Phe 275	cat His	acg Thr	931
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ccg Pro 310	cat His	tct Ser	ggt Gly	gtg Val	gct Ala 315	Gly ggg	cat His	act Thr	ccg Pro	cag Gln 320	tcg Ser	gtg Val	ttt Phe	gat Asp	ggt Gly 325	1075
agt Ser	tgg Trp	agg Arg	Ala	gct Ala 330	cat His	agg Arg	ttg Leu .	Arg	gtg Val 335	cag Gln	gcg Ala	ttg Leu	gat Asp	gcc Ala 340	cat His	1123

1171

1219

1268

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gtt Val	gct Ala	ggt Gly 360	' Val	g gtg . Val	cgt Arg	ctt Leu	aat Asn 365	Gly	gcg Ala	cgt Arg	gat Asp	gat Asp 370	ggg	tct Ser	gta Val
cag Gln	gag Glu 375	Arg	gtt Val	ggt Gly	ggt Gly	gta Val 380	gcg Ala	tcg Ser	ctg Leu	tta Leu	agt Ser 385	gct Ala	tga	gtta	gca
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Leu	Arg	Leu 35	Ile	Lys	Leu	Ser	Lys 40	Ser	Thr	Ala	Tyr	Tyr 45	Arg	Asn	Lys
Pro	Arg 50	Pro	Arg	Pro	Ala	Pro 55	Lys	Pro	Val	Leu	Gln 60	Ala	Val	Pro	Ala
Pro 65	Thr	Ala	Pro	Gly	Val 70	Glu	Pro	Thr	Pro	Glu 75	Pro	Trp	Gln	Gly	Lys 80
Glu	Pro	Ala	Val	Ser 85	Ser	Val	Arg	Gln	Ala 90	Leu	Ala	Glu	His	Glu 95	Arg
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Gly	Val	Phe 115	Asn	Met	Leu	Phe	Asn 120	Lys	Gly	Ile	Tyr	Arg 125	Ala	Ser	Leu
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Arg 145	Val	Ser	Ala	Leu	Ser 150	Pro	Gly	Lys	Arg	Ser 155	Pro	Thr	Pro	Arg	Val 160
Lys	Pro	Arg	Leu	Glu 165	Ala	Thr	Gln	Pro	Gly 170	Gln	Val	Val	Cys	Trp 175	Asp
Val	Thr	Phe	Leu 180	Pro	Ser	Leu	Val	Arg 185	Gly	Lys	Thr	Tyr	Ala 190	Leu	His
Leu	Ala	Ile 195	Asp	Leu	Phe	Ser	Arg 200	Lys	Ile	Val	Gly	Ala 205	Lys	Val	Ala
Pro	Thr	Glu	Asn	Thr	Ser	Thr	Ala	Val	Glu	Leu	Leu	Thr	Gln	Val	Leu

210 215 220 Ala Asp Asn Pro Gly Val Val Thr Val His Ser Asp Asn Gly Ser Ala 235 Met Thr Ser Thr Arg Val Arg Arg Leu Leu Ala Asp His Gly Val Ala Leu Ser Leu Ile Arg Pro Arg Val Ser Asp Asp Asn Ala Phe Val Glu Ser Val Phe His Thr Leu Lys Tyr Arg Pro Phe Tyr Pro Lys Val Phe 280 285 Ala Ser Met Asp Gln Ala Arg Val Trp Val Glu Glu Phe Val Val Tyr Tyr Asn Thr Val His Pro His Ser Gly Val Ala Gly His Thr Pro Gln 310 315 Ser Val Phe Asp Gly Ser Trp Arg Ala Ala His Arg Leu Arg Val Gln 325 330 Ala Leu Asp Ala His Tyr Arg Gln Phe Pro Gln Arg Tyr Val Gly Arg 340 345 Pro Val Val Gln Glu Val Ala Gly Val Val Arg Leu Asn Gly Ala Arg 360 Asp Asp Gly Ser Val Gln Glu Arg Val Gly Gly Val Ala Ser Leu Leu 375 380 Ser Ala 385 <210> 255 <211> 1065 <212> DNA <213> Corynebacterium glutamicum <220> <221> CDS <222> (101)..(1042) <223> RXN03049 <400> 255 accagggtgc acgttccctg cacttcatcg ccatggtgtt gatgacgggc tttgtcatca 60 tgcacgtcgg cctggttttt tggtccatgg cgactacaac atg gtc cac atg gtc 115 Met Val His Met Val ttc ggc gat atg aac act gac cgt gcg gcg cag gcc tac atc atc gtg 163 Phe Gly Asp Met Asn Thr Asp Arg Ala Ala Gln Ala Tyr Ile Ile Val 10

atc acc acc atc gtc atg gtg gtg ttg ttc tgg atc gtg ctc aga tat

Ile Thr Thr Ile Val Met Val Val Leu Phe Trp Ile Val Leu Arg Tyr

30

25

211

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ccc Pro	aac Asn	ggc Gly 120	acc Thr	gag Glu	aaa Lys	acc Thr	atc Ile 125	acc Thr	ctc Leu	gac Asp	gat Asp	ctg Leu 130	cgg Arg	gag Glu	ctg Leu	499
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Arg Xaa Asp Leu Tyr Xaa Ile Arg Arg His Xaa His Arg Gly Thr Asp 280 285 290

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Ile Val Leu Arg Tyr Trp Ser Leu Ala Asp Arg Ala Arg Ala Gln Arg 35 40 45

Phe Thr Ala Ser Ile Thr Glu Ile Gly Arg Lys Ile Phe Leu Asn Arg 50 55 60

Leu Arg Pro Arg Met Ser Arg Gln Asn Thr Tyr Thr Asp Lys Asp Ile 65 70 75 80

Ser Gln Phe His Trp Thr Asn Gly Leu Pro Pro Thr Asp Asp Glu Ser 85 90 95

Pro Glu Trp Ile Ala Ala Arg Asp Asn Glu Trp Glu Gly Tyr Thr Ile 100 105 110

Thr Leu Gly Asp Asp Pro Asn Gly Thr Glu Lys Thr Ile Thr Leu Asp 115

Asp Leu Arg Glu Leu Pro Gln Thr Ser Tyr Val Ala Val His Thr Cys 130 135 140

Met Gln Gly Trp Ser Ala Thr Ala Arg Trp Thr Gly Val Arg Leu Arg 145 150 155 160

Asp Val Leu Cys His Asp Leu Val His Thr Leu Asp Leu His His Arg 165 170 175

His Ser Pro Arg Leu Leu Thr Ile Glu Ile Ile Pro Lys Pro Leu Pro 180 185 190

Pro Glu Thr Arg Cys Lys Ile Ile Asp Phe Asp Leu Phe Ala Pro Asn 195 200 205

Ser Pro Ser Ile Glu Glu Phe Cys Ser Arg Leu Lys Ile Ser Arg Arg 210 215 220

Ser Phe Tyr Asn Ile Arg Asn Arg Tyr Gln Gln Asp Ala Ser Ala Ala

225 230 235 240 Leu His Pro Arg Ser Ser Ala Gln Ile Thr Ser Arg Arg Thr Tyr Asp 250 Glu Ser Ile Thr Ser Ile Leu Leu Ala Ile Arg Ala Pro Pro Glu Ser 265 Pro Arg Met Gly Xaa Arg Xaa Asp Leu Tyr Xaa Ile Arg Arg His Xaa 280 His Arg Gly Thr Asp Cys Thr Asp Ser Ile Arg Leu Asn Tyr Arg Leu 295 300 Leu Val Thr Arg Cys Arg Ser Ser Arg Lys 310 <210> 257 <211> 951 <212> DNA <213> Corynebacterium glutamicum <220> <221> CDS <222> (101)..(928) <223> RXN03070 <400> 257 gtggataaaa gggaaaacat aggggtcatg aaatagaaca agcacgaggc ctggtaaata 60 cgaattcgac caagaaaacg taaacacccc aggagtactc gtg cct gcc ctt cca Val Pro Ala Leu Pro tca tct atc atc gac ccc ctc tgg cgc cag ttc tcc gcc tta atc cca 163 Ser Ser Ile Ile Asp Pro Leu Trp Arg Gln Phe Ser Ala Leu Ile Pro ccg gtt atc atc acc cac cca cta ggg tgc cac cgt gca cgc att gct 211 Pro Val Ile Ile Thr His Pro Leu Gly Cys His Arg Ala Arg Ile Ala gac egg ate ate gte gae aaa ete ate gea gtg ett gte ete ggt gte 259 Asp Arg Ile Ile Val Asp Lys Leu Ile Ala Val Leu Val Leu Gly Val 45 tcc tat atc aag att tcc gat tcc acc tgc tca gcc acc acg ata cgc 307 Ser Tyr Ile Lys Ile Ser Asp Ser Thr Cys Ser Ala Thr Thr Ile Arg acc cgc cga gac gag tgg atc act gcc ggg att ttc aag aat tta gaa Thr Arg Arg Asp Glu Trp Ile Thr Ala Gly Ile Phe Lys Asn Leu Glu 75 cag atc tgt ctg gag tcc tac gac cgt ttc atc ggg tta gac cta gaa 403 Gln Ile Cys Leu Glu Ser Tyr Asp Arg Phe Ile Gly Leu Asp Leu Glu aac tta aat gtt gat ggc tgc att gtt aaa gct ccc tgc ggc gga gag Asn Leu Asn Val Asp Gly Cys Ile Val Lys Ala Pro Cys Gly Gly Glu

105 110 115 gta gcc ggc aga ttc ccg gtt gac cgg gaa aaa ggc acc aaa cgc tcg 499 Val Ala Gly Arg Phe Pro Val Asp Arg Glu Lys Gly Thr Lys Arg Ser tta atg gtc gat gga cat gga atc ccg atc ggg tgc gtc gcc gga 547 Leu Met Val Asp Gly His Gly Ile Pro Ile Gly Cys Val Val Ala Gly 140 gcc aat cgg cat gat tta ccg ttg tta gct gca acc ttg gac acg ctc 595 Ala Asn Arg His Asp Leu Pro Leu Leu Ala Ala Thr Leu Asp Thr Leu 155 160 ggc cgg ttt ggg ggc tct ctt ccc gat cag atc acg gtg cat ctc gat 643 Gly Arg Phe Gly Gly Ser Leu Pro Asp Gln Ile Thr Val His Leu Asp 170 175 gct ggg tat gac teg aag aaa ace ege agg eta ete age gaa ttt ggt 691 Ala Gly Tyr Asp Ser Lys Lys Thr Arg Arg Leu Leu Ser Glu Phe Gly 185 190 tat agc tgg gtg atc agc att aaa ggt gag ccg ctg cag gct ggg act 739 Tyr Ser Trp Val Ile Ser Ile Lys Gly Glu Pro Leu Gln Ala Gly Thr 210 cgg tgg gtg gtg cgt act aac tct tgg cat aac cgg ggt ttt aag 787 Arg Trp Val Val Glu Arg Thr Asn Ser Trp His Asn Arg Gly Phe Lys 215 220 225 aaa ctt agt atc tgc acc gaa cgt tgt acc cgg gtt gtg gaa gcg ttt 835 Lys Leu Ser Ile Cys Thr Glu Arg Cys Thr Arg Val Val Glu Ala Phe 240 atc gct tta gcc aac gcg gtg att att ctg cgt cgg ctt atc aaa cag 883 Ile Ala Leu Ala Asn Ala Val Ile Ile Leu Arg Arg Leu Ile Lys Gln 250 255 gcc tgg act agt tac cgc tgg gac acc cga ccg ggc cac aga cct 928 Ala Trp Thr Ser Tyr Arg Trp Asp Thr Arg Pro Gly His Arg Pro taatctatcc gcgcaatctc taa 951 <210> 258 <211> 276 <212> PRT <213> Corynebacterium glutamicum <400> 258 Val Pro Ala Leu Pro Ser Ser Ile Ile Asp Pro Leu Trp Arg Gln Phe Ser Ala Leu Ile Pro Pro Val Ile Ile Thr His Pro Leu Gly Cys His 25 Arg Ala Arg Ile Ala Asp Arg Ile Ile Val Asp Lys Leu Ile Ala Val

Leu Val Leu Gly Val Ser Tyr Ile Lys Ile Ser Asp Ser Thr Cys Ser

50 60 Ala Thr Thr Ile Arg Thr Arg Arg Asp Glu Trp Ile Thr Ala Gly Ile Phe Lys Asn Leu Glu Gln Ile Cys Leu Glu Ser Tyr Asp Arg Phe Ile 85 90 Gly Leu Asp Leu Glu Asn Leu Asn Val Asp Gly Cys Ile Val Lys Ala 105 Pro Cys Gly Gly Glu Val Ala Gly Arg Phe Pro Val Asp Arg Glu Lys 115 120 Gly Thr Lys Arg Ser Leu Met Val Asp Gly His Gly Ile Pro Ile Gly 135 Cys Val Val Ala Gly Ala Asn Arg His Asp Leu Pro Leu Leu Ala Ala 145 150 Thr Leu Asp Thr Leu Gly Arg Phe Gly Gly Ser Leu Pro Asp Gln Ile Thr Val His Leu Asp Ala Gly Tyr Asp Ser Lys Lys Thr Arg Arg Leu 180 185 Leu Ser Glu Phe Gly Tyr Ser Trp Val Ile Ser Ile Lys Gly Glu Pro Leu Gln Ala Gly Thr Arg Trp Val Val Glu Arg Thr Asn Ser Trp His 210 215 Asn Arg Gly Phe Lys Lys Leu Ser Ile Cys Thr Glu Arg Cys Thr Arg 230 Val Val Glu Ala Phe Ile Ala Leu Ala Asn Ala Val Ile Ile Leu Arg 245 Arg Leu Ile Lys Gln Ala Trp Thr Ser Tyr Arg Trp Asp Thr Arg Pro 260 265 Gly His Arg Pro 275 <210> 259 <211> 742 <212> DNA <213> Corynebacterium glutamicum <220>

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ccc Pro	gaa Glu	ggg	tgc Cys	gaa Glu 10	Val	ggc	att Ile	cgt Arg	aga Arg 15	Thr	atc Ile	cca Pro	gag Glu	gaa Glu 20	agc Ser	163
cgt Arg	acg Thr	gct Ala	ttc Phe 25	Leu	gac Asp	atg Met	atc Ile	aat Asn 30	caa Gln	ggt Gly	atg Met	tca Ser	ggt Gly 35	ctt Leu	gct Ala	211
gcg Ala	tct Ser	aca Thr 40	gcg Ala	gtc Val	GJ À aaa	gtc Val	agt Ser 45	gaa Glu	ttc Phe	acc Thr	Gly	cga Arg 50	aag Lys	tgg Trp	gcg Ala	259
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ttt Phe 70	gac Asp	acc Thr	gcc Ala	gag Glu	aaa Lys 75	ctt Leu	gag Glu	att Ile	gca Ala	gcc Ala 80	agc Ser	atg Met	cta Leu	gag Glu	aaa Lys 85	355
gga Gly	tgc Cys	cta Leu	ccc Pro	cga Arg 90	gaa Glu	atc Ile	ggc Gly	gag Glu	tat Tyr 95	gtc Val	ggc Gly	atg Met	act Thr	cgg Arg 100	gcc Ala	403
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cgt Arg 150	gag Glu	gac Asp	tac Tyr	aca Thr	aca Thr 155	ctg Leu	ttt Phe	gac Asp	gag Glu	tta Leu 160	tct Ser	gcg Ala	ttg Leu	ggg Gly	ttg Leu 165	595
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tta Leu	cgc Arg	Phe	tct Ser 185	tat Tyr	atg Met	tcg Ser	tgt Cys	gta Val 190	gtg Val	ccg Pro	tta Leu	ttt Phe	gct Ala 195	gat Asp	gaa Glu	691
atc Ile	ьуs	atc Ile 200	gta Val	gga Gly	caa Gln	Gly	aca Thr 205	cga Arg	tta Leu	tcg Ser	tta Leu	gaa Glu 210	gag Glu	aaa Lys	atg Met	739
atg Met																742

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Gly Arg Lys Trp Ala Lys Ala Ala Gly Val Lys Leu Thr Arg Gly Pro
50 55 60

Arg Gly Gly Asn Ala Phe Asp Thr Ala Glu Lys Leu Glu Ile Ala Ala 65 70 75 80

Ser Met Leu Glu Lys Gly Cys Leu Pro Arg Glu Ile Gly Glu Tyr Val 85 90 95

Gly Met Thr Arg Ala Asn Ile Ser Leu Trp Arg Lys Gln Gly Pro Asp 100 105 110

Lys Leu Arg Gln Arg Ala Ala Thr Leu Arg Thr Gly Lys Arg Ala Ala 115 120 125

Glu Phe Ile His Ala Pro Val Met Gly Pro Tyr Tyr Gly Pro Arg Thr 130 135 140

Leu His Gln Val Leu Arg Glu Asp Tyr Thr Thr Leu Phe Asp Glu Leu 145 150 155 160

Ser Ala Leu Gly Leu Pro Ala Gln Val Cys Gly Ala Leu Leu His Leu 165 170 175

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ccg Pro	cgg Arg 85	aaa Lys	atg Met	cat His	ggt Gly	ttt Phe 90	aaa Lys	agc Ser	gcg Ala	acg Thr	cag Gln 95	gta Val	tat Tyr	gaa Glu	ata Ile	346
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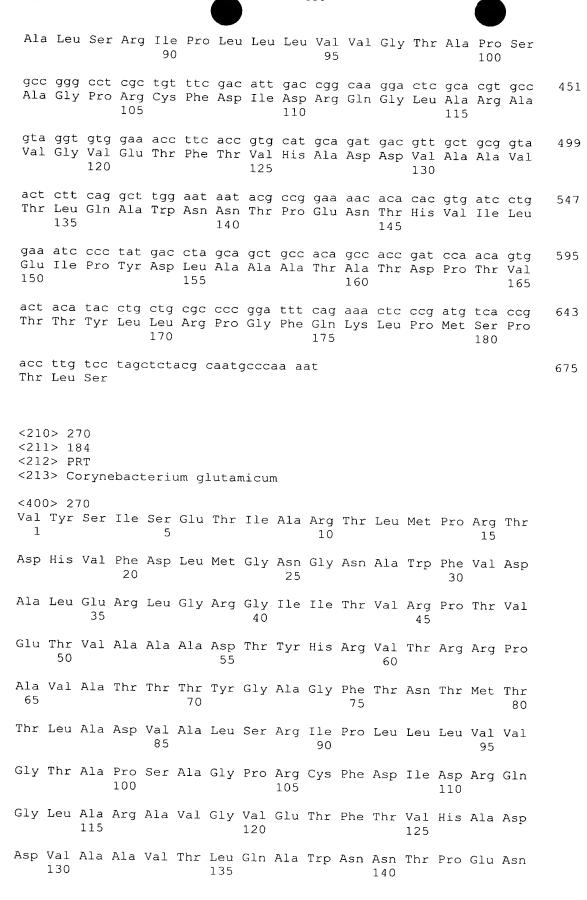
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Ala	Ala	Leu	Ile 20	Pro	Pro	Val	Thr	Asp 25		His	Pro	Leu	Arg 30	Cys	His	
Arg	Pro	Arg 35	Ile	Pro	Asp	Arg	Ile 40	Ile	Phe	Asp	Lys	Leu 45	Ile	Gln	Val	
Leu	Val 50	Leu	Gly	Ala	Ser	Tyr 55	Ala	Lys	Ile	Ala	Asp 60	Thr	Thr	Cys	Ser	
Ala 65	Thr	Thr	Leu	Arg	Thr 70	Arg	Arg	Asp	Glu	Trp 75	Ile	Thr	Ala	Gly	Ile 80	
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cgg Arg	aag Lys	ttc Phe	aag Lys 20	cgc Arg	acg Thr	acc Thr	ggc Gly	agc Ser 25	gat Asp	cat His	acc Thr	ttc Phe	aac Asn 30	atc Ile	gca Ala	96
ccg Pro	aac Asn	ttt Phe 35	ctg Leu	cag Gln	cag Gln	gac Asp	ttt Phe 40	atg Met	gcg Ala	agc Ser	agg Arg	ccg Pro 45	aac Asn	cag Gln	aag Lys	144
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Thr His Val Ile Leu Glu Ile Pro Tyr Asp Leu Ala Ala Ala Thr Ala 145 150 155 160

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Leu Pro Met Ser Pro Thr Leu Ser 180

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				gac Asp 10										163

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Ile Thr Gly Ala Ser Asp Ala Gly Asp Tyr Thr Leu Ile Glu Ala Asp
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Ala Leu Asp Tyr Thr Ser Thr Cys Pro Glu Cys Ser Gln Pro Gly Val
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Phe Arg His His Thr His Arg Met Leu Ile Asp Leu Pro Ile Val Gly
55 60 65

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Phe Pro Thr Lys Leu Phe Ile Arg Leu Pro Arg Tyr Arg Cys Thr Asn
70 75 80 85

ccc aca tgt aag caa aag tat ttc caa gca gaa cta agc tgc gct gac 403 Pro Thr Cys Lys Gln Lys Tyr Phe Gln Ala Glu Leu Ser Cys Ala Asp 90 95 100

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cta ggg tgg gat tta acc tgc caa cta gcc ctc gat atg tgc cgt gag 547 Leu Gly Trp Asp Leu Thr Cys Gln Leu Ala Leu Asp Met Cys Arg Glu

135 145 ctg gtc tat aac gat cct cac cat ctt gat gga gtg tat gtc att ggg 595 Leu Val Tyr Asn Asp Pro His His Leu Asp Gly Val Tyr Val Ile Gly 155 gtg gat gag cat aag tgg tca cat aat agg gct aag cat ggt gat ggg 643 Val Asp Glu His Lys Trp Ser His Asn Arg Ala Lys His Gly Asp Gly 170 175 180 ttt gtc acc gtg att gtc gat atg acc ggg cat cgg tat gac tca cgg 691 Phe Val Thr Val Ile Val Asp Met Thr Gly His Arg Tyr Asp Ser Arg 185 190 195 tgt cct gcc cgg tta tta gat gtc gtc cca ggt cgt agt gct gat gct 739 Cys Pro Ala Arg Leu Leu Asp Val Val Pro Gly Arg Ser Ala Asp Ala 200 205 tta egg tee tgg ett gge tee ege ggt gaa eag tte ege aat eag ata 787 Leu Arg Ser Trp Leu Gly Ser Arg Gly Glu Gln Phe Arg Asn Gln Ile 215 220 cgg atc gtg tcc atg gat gga ttc caa ggc tac gcc aca gca agt aaa 835 Arg Ile Val Ser Met Asp Gly Phe Gln Gly Tyr Ala Thr Ala Ser Lys 230 235 gaa etc att ect tet get egt ege gtg atg gat eea tte eat gtt gtg 883 Glu Leu Ile Pro Ser Ala Arg Arg Val Met Asp Pro Phe His Val Val 250 cgg ctt gct ggt gac aag ctc acc gcc tgc cgg caa cgc ctc cag cgg 931 Arg Leu Ala Gly Asp Lys Leu Thr Ala Cys Arg Gln Arg Leu Gln Arg 265 gag aaa tac cag cgt cgt ggt tta agc cag gat ccg ttg tat aaa aac 979 Glu Lys Tyr Gln Arg Arg Gly Leu Ser Gln Asp Pro Leu Tyr Lys Asn 280 egg aag ace ttg ttg ace acg cae aag tgg ttg agt eet egt eag eaa 1027 Arg Lys Thr Leu Leu Thr Thr His Lys Trp Leu Ser Pro Arg Gln Gln 295 gaa ago ttg gag cag ttg tgg gcg tat gac aaa gac tac gqg gcg tta 1075 Glu Ser Leu Glu Gln Leu Trp Ala Tyr Asp Lys Asp Tyr Gly Ala Leu 310 315 aag ctt gcg tgg ctt gcg tat cag gcg att att gat tgt tat cag atg 1123 Lys Leu Ala Trp Leu Ala Tyr Gln Ala Ile Ile Asp Cys Tyr Gln Met 330 335 ggt aat aag cgt gaa gcg aag aag aaa atg cgg acc att att gat cag 1171 Gly Asn Lys Arg Glu Ala Lys Lys Lys Met Arg Thr Ile Ile Asp Gln 350 ctt cgg gtg ttg aag ggg ccg aat aag gaa ctc gcg cag ttg ggt cgt 1219 Leu Arg Val Leu Lys Gly Pro Asn Lys Glu Leu Ala Gln Leu Gly Arg agt ttg ttt aaa cga ctt ggt gat gtg ttg gcg tat ttc gat gtt ggt 1267 Ser Leu Phe Lys Arg Leu Gly Asp Val Leu Ala Tyr Phe Asp Val Gly

1315

1363

1408

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Trp	Ile	Leu 115	Gln	Arg	Leu	Ala	Ile 120	Asp	Arg	Met	Ser	Val 125	His	Ala	Thr
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Asp 145	Met	Cys	Arg	Glu	Leu 150	Val	Tyr	Asn	Asp	Pro 155	His	His	Leu	Asp	Gly 160
Val	Tyr	Val	Ile	Gly 165	Val	Asp	Glu	His	Lys 170	Trp	Ser	His	Asn	Arg 175	Ala
Lys	His	Gly	Asp 180	Gly	Phe	Val	Thr	Val 185	Ile	Val	Asp	Met	Thr 190	Gly	His
Arg	Tyr	Asp 195	Ser	Arg	Cys	Pro	Ala 200	Arg	Leu	Leu	Asp	Val 205	Val	Pro	Gly

Arg Ser Ala Asp Ala Leu Arg Ser Trp Leu Gly Ser Arg Gly Glu Gln 210 215 Phe Arg Asn Gln Ile Arg Ile Val Ser Met Asp Gly Phe Gln Gly Tyr 230 Ala Thr Ala Ser Lys Glu Leu Ile Pro Ser Ala Arg Arg Val Met Asp Pro Phe His Val Val Arg Leu Ala Gly Asp Lys Leu Thr Ala Cys Arg Gln Arg Leu Gln Arg Glu Lys Tyr Gln Arg Arg Gly Leu Ser Gln Asp Pro Leu Tyr Lys Asn Arg Lys Thr Leu Leu Thr Thr His Lys Trp Leu 295 Ser Pro Arg Gln Gln Glu Ser Leu Glu Gln Leu Trp Ala Tyr Asp Lys 315 Asp Tyr Gly Ala Leu Lys Leu Ala Trp Leu Ala Tyr Gln Ala Ile Ile Asp Cys Tyr Gln Met Gly Asn Lys Arg Glu Ala Lys Lys Met Arg 345 Thr Ile Ile Asp Gln Leu Arg Val Leu Lys Gly Pro Asn Lys Glu Leu 355 Ala Gln Leu Gly Arg Ser Leu Phe Lys Arg Leu Gly Asp Val Leu Ala 375 Tyr Phe Asp Val Gly Val Ser Asn Gly Pro Val Glu Ala Ile Asn Gly 390 Arg Leu Glu His Leu Arg Gly Ile Ala Leu Gly Phe Arg Asn Leu Asn 405 410 His Tyr Ile Leu Arg Cys Leu Ile His Ser Gly Gln Leu Val His Lys 425 Ile Asn Ala Leu 435 <210> 273 <211> 2787 <212> DNA <213> Corynebacterium glutamicum <220> <221> CDS <222> (101)..(2764) <223> RXA02788

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Val Gln Thr His Glu

1 atc agg gag cgt ttt acc aat cac ttc gtc aat gcc ggt cac cag gcg 163 Ile Arg Glu Arg Phe Thr Asn His Phe Val Asn Ala Gly His Gln Ala gta cct agc gcg tca ctg att ctc gac gac cct aac ctg ctg ttc gtt 211 Val Pro Ser Ala Ser Leu Ile Leu Asp Asp Pro Asn Leu Leu Phe Val aac gca ggc atg gtt cca ttc aag ccg tac ttc ctg ggc cag cag acc 259 Asn Ala Gly Met Val Pro Phe Lys Pro Tyr Phe Leu Gly Gln Gln Thr cca cct ttt gaa aac ggc act gcg act tcc att cag aag tgt gtt cgt 307 Pro Pro Phe Glu Asn Gly Thr Ala Thr Ser Ile Gln Lys Cys Val Arg 55 acc ctg gat atc gaa gaa gtg ggt atc acc act cgc cac aat acc ttc 355 Thr Leu Asp Ile Glu Glu Val Gly Ile Thr Thr Arg His Asn Thr Phe 70 75 ttc cag atg gca ggt aac ttc tcc ttc ggc cag tac ttc aaa gaa ggc 403 Phe Gln Met Ala Gly Asn Phe Ser Phe Gly Gln Tyr Phe Lys Glu Gly 90 gca att acc cac gca tgg ggc ctt ctg act ggt tcc gta gca gac gga 451 Ala Ile Thr His Ala Trp Gly Leu Leu Thr Gly Ser Val Ala Asp Gly 105 ggc ttt ggc ctt gat cca gag cgc ctc tgg gtc act gtg tac ctc gat 499 Gly Phe Gly Leu Asp Pro Glu Arg Leu Trp Val Thr Val Tyr Leu Asp 120 gat gac gag gct gca gag atc tgg gaa aag atc ggc gtc cca tca 547 Asp Asp Glu Ala Ala Glu Ile Trp Glu Lys Lys Ile Gly Val Pro Ser 135 gag ege ate eag ege etg ggt atg get gae aac tae tgg tee atg ggt 595 Glu Arg Ile Gln Arg Leu Gly Met Ala Asp Asn Tyr Trp Ser Met Gly 150 gta cca gga cct tgt ggc cct tgc tcc gag atc tac tac gac cgc ggc 643 Val Pro Gly Pro Cys Gly Pro Cys Ser Glu Ile Tyr Tyr Asp Arg Gly gag aag tac ggc aag gaa ggc ggc cct gtc gct gac gac aac cgc tac 691 Glu Lys Tyr Gly Lys Glu Gly Gly Pro Val Ala Asp Asp Asn Arg Tyr atg gag atc tgg aac ctg gtc ttc atg gag aag gaa cgc gga cag ggt 739 Met Glu Ile Trp Asn Leu Val Phe Met Glu Lys Glu Arg Gly Gln Gly 205 att ggc aag gac aac ttc gac atc ctt ggc gat ctt cca aag aag aac 787 Ile Gly Lys Asp Asn Phe Asp Ile Leu Gly Asp Leu Pro Lys Lys Asn 220 atc gat acc ggc atg ggc gtc gag cgc gtt gcc tgc atc ctc cag gat Ile Asp Thr Gly Met Gly Val Glu Arg Val Ala Cys Ile Leu Gln Asp 230

gtt Val	gaa Glu	aac Asn	gtc Val	tac Tyr 250	gaa Glu	acc Thr	gac Asp	ctg Leu	ctg Leu 255	cgc Arg	cca Pro	gtc Val	atc Ile	gac Asp 260	gtt Val	883
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atc Ile	tac Tyr 455	cgc Arg	gaa Glu	tgg Trp	gtc Val	gac Asp 460	aac Asn	aac Asn	cca Pro	acc Thr	gta Val 465	ttc Phe	acc Thr	ggc Gly	ttt Phe	1507
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ggt Gly	inr	cac His 680	gtt . Val .	gcg Ala	cac His	Ser	tca Ser 685	cag Gln	atc Ile	ggc Gly	cca Pro	gtg Val 690	gca Ala	ctg Leu	ttg Leu	2179
ggt Gly	gaa Glu 695	tca Ser	tcc . Ser :	atc (GLY .	tcc Ser 700	ggc Gly	gtg Val	cgc Arg	cgc Arg	atc Ile 705	gag Glu	gcc Ala	tac Tyr	tcc Ser	2227
ggc Gly: 710	ctg a Leu A	aac Asn :	tcc Ser	Pne A	aac Asn ' 715	tac Tyr	ctg Leu	tcc Ser	Lys	gaa Glu 720	cgc Arg	gca Ala	ctc Leu	gcc Ala	gag Glu 725	2275
ggt ·	ttg (gca a	agc t	tcc (ctg a	aag (gct (cca	tcc	gag	gaa	ctt	cca	gag	cgc	2323

Gly	/ Leu	Ala	Ser	Ser 730	Leu	Lys	Ala	Pro	Ser 735	Glu	Glu	Leu	Pro	Glu 740	Arg	
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gac Asp 790	aac Asn	acc Thr	aac Asn	gcc Ala	ggt Gly 795	gac Asp	ctg Leu	cgc Arg	acc Thr	atc Ile 800	gca Ala	acc Thr	acc Thr	ctg Leu	aag Lys 805	2515
gac Asp	aag Lys	ctc Leu	ggc Gly	gac Asp 810	cgc Arg	gaa Glu	ggc Gly	gtc Val	ttg Leu 815	gtt Val	att Ile	gcc Ala	tcc Ser	gac Asp 820	aac Asn	2563
gcc Ala	ggc Gly	aag Lys	gtt Val 825	cca Pro	ttc Phe	gtg Val	gta Val	gct Ala 830	gca Ala	acc Thr	aag Lys	gcc Ala	gct Ala 835	gtg Val	gct Ala	2611
cgc Arg	gga Gly	gct Ala 840	cac His	tcc Ser	ggc Gly	aac Asn	ctg Leu 845	gtt Val	aag Lys	ctc Leu	gtt Val	ggt Gly 850	tcc Ser	tac Tyr	atc Ile	2659
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Asn Leu Leu Phe Val Asn Ala Gly Met Val Pro Phe Lys Pro Tyr Phe 35 40 45

Leu Gly Gln Gln Thr Pro Pro Phe Glu Asn Gly Thr Ala Thr Ser Ile 50 55 60

Gln Lys Cys Val Arg Thr Leu Asp Ile Glu Glu Val Gly Ile Thr Thr 70 Arg His Asn Thr Phe Phe Gln Met Ala Gly Asn Phe Ser Phe Gly Gln 85 90 Tyr Phe Lys Glu Gly Ala Ile Thr His Ala Trp Gly Leu Leu Thr Gly Ser Val Ala Asp Gly Gly Phe Gly Leu Asp Pro Glu Arg Leu Trp Val Thr Val Tyr Leu Asp Asp Glu Ala Ala Glu Ile Trp Glu Lys Lys 135 Ile Gly Val Pro Ser Glu Arg Ile Gln Arg Leu Gly Met Ala Asp Asn 155 Tyr Trp Ser Met Gly Val Pro Gly Pro Cys Gly Pro Cys Ser Glu Ile 165 Tyr Tyr Asp Arg Gly Glu Lys Tyr Gly Lys Glu Gly Gly Pro Val Ala 185 Asp Asp Asn Arg Tyr Met Glu Ile Trp Asn Leu Val Phe Met Glu Lys 200 205 Glu Arg Gly Gln Gly Ile Gly Lys Asp Asn Phe Asp Ile Leu Gly Asp 215 Leu Pro Lys Lys Asn Ile Asp Thr Gly Met Gly Val Glu Arg Val Ala 230 235 Cys Ile Leu Gln Asp Val Glu Asn Val Tyr Glu Thr Asp Leu Leu Arg 250 Pro Val Ile Asp Val Ala Glu Thr Leu Thr Gly Thr Lys Tyr Gly Ser 260 265 Asp Asn Thr Ser Asp Ile Arg Phe Arg Val Ile Ala Asp His Ser Arg 280 Thr Gly Met Met Leu Ile Leu Asp Gly Val Thr Pro Gly Asn Glu Gly 290 295 Arg Gly Tyr Ile Leu Arg Arg Leu Leu Arg Arg Ile Ile Arg Ser Ala 310 Arg Leu Leu Gly Ala Thr Gly Glu Thr Met Glu Gln Phe Met Asn Thr 325 Ile Met Asp Thr Met Thr Pro Ser Tyr Pro Glu Ile Ala Asp Asn Arg 340 Glu Arg Ile Met Arg Val Ala Val Thr Glu Glu Arg Ala Phe Leu Lys Thr Leu Val Ser Gly Thr His Leu Phe Glu Glu Ala Ala Thr Ser Ile 370 375

Lys Ala Ala Gly Ser Thr Lys Val Ala Gly Ala Gln Ala Phe Ala Leu 390 His Asp Thr Tyr Gly Phe Pro Ile Asp Leu Thr Leu Glu Met Ala Ala 410 Glu Ala Gly Leu Glu Val Asp Val Glu Gly Phe Asp Ser Leu Met Ala 425 Glu Gln Arg Ser Arg Ala Lys Ala Asp Ser Gln Ala Lys Lys His Gly His Thr Asp Leu Ser Ile Tyr Arg Glu Trp Val Asp Asn Asn Pro Thr 455 Val Phe Thr Gly Phe Glu Glu Leu Asp Ser Gln Ser Lys Val Leu Gly 475 Leu Leu Ser Asp Gly Ala Lys Ile Ser Glu Ala Thr Glu Gly Gln Glu 485 490 Val Glu Val Ile Leu Asp Gln Ser Pro Leu Tyr Ala Glu Ser Gly Gly 505 Gln Leu Gly Asp Arg Gly Gln Ile Leu Leu Gly Asp Thr Val Leu Asp 520 Val His Asp Val Gln Lys Ile Gly Lys Lys Leu Trp Val His Lys Ala 535 Leu Val Ala Asn Gly Gly Leu Ala Val Gly Asp Glu Val Val Ala Ser 550 555 Val Asp Lys Gln Trp Arg His Ala Ala Arg Gln Ala His Thr Ala Thr 565 His Leu Ile His Ala Ala Leu Arg Gln Val Leu Gly Pro Thr Ala Leu 585 Gln Ala Gly Ser Met Asn Lys Pro Gly Tyr Leu Arg Phe Asp Phe Asn 595 Tyr Thr Glu Gln Leu Thr Pro Ala Gln Val Glu Gln Ile Gln Ala Ile Thr Asn Glu Ala Val Asp Thr Asp Trp Ala Val Asn Thr Val Glu Thr Ser Leu Glu Glu Ala Lys Ala Met Gly Ala Met Ala Leu Phe Gly Glu Asn Tyr Gly Ser Thr Val Arg Val Val Glu Ile Gly Gly Pro Phe Ser Met Glu Leu Cys Gly Gly Thr His Val Ala His Ser Ser Gln Ile Gly Pro Val Ala Leu Leu Gly Glu Ser Ser Ile Gly Ser Gly Val Arg Arg 695 Ile Glu Ala Tyr Ser Gly Leu Asn Ser Phe Asn Tyr Leu Ser Lys Glu

705 710 715 720 Arg Ala Leu Ala Glu Gly Leu Ala Ser Ser Leu Lys Ala Pro Ser Glu 730 Glu Leu Pro Glu Arg Val Ala Gln Leu Val Asp Lys Leu Lys Ala Ala 745 Glu Lys Glu Ile Glu Ala Leu His Arg Gln Gln Leu Met Ala Gln Thr 760 Ala Asp Leu Leu Asn Asn Ala Gln Glu Ile Gly Gly Val Thr Thr Leu Leu Leu Arg Val Lys Asp Asn Thr Asn Ala Gly Asp Leu Arg Thr Ile Ala Thr Thr Leu Lys Asp Lys Leu Gly Asp Arg Glu Gly Val Leu Val Ile Ala Ser Asp Asn Ala Gly Lys Val Pro Phe Val Val Ala Ala Thr 825 Lys Ala Ala Val Ala Arg Gly Ala His Ser Gly Asn Leu Val Lys Leu Val Gly Ser Tyr Ile Asp Gly Arg Gly Gly Gly Lys Ala Asp Leu Ala 855 Gln Gly Ser Gly Ala Asn Ile Ala Gly Leu Glu Ser Ala Phe Gly Ala Val Arg Ala Glu Ile Glu Ala Leu 885 <210> 275 <211> 1773 <212> DNA <213> Corynebacterium glutamicum <220> <221> CDS <222> (101)..(1750) <223> RXN00975 <400> 275 tatacagaga ccaatgattt ttcattaaaa aggcagggat ttgttataag tatgggtcgt 60 attetgtgcg acgggtgtac ctcggctaga atttctcccc atg aca cca gct gat 115 Met Thr Pro Ala Asp ctc gca aca ttg att aaa gag acc gcg gta gag gtt ttg acc tcc cgc 163 Leu Ala Thr Leu Ile Lys Glu Thr Ala Val Glu Val Leu Thr Ser Arg 1.5 gag etc gat act tet gtt ett eeg gag eag gta gtt gtg gag egt eeg 211 Glu Leu Asp Thr Ser Val Leu Pro Glu Gln Val Val Glu Arg Pro 25 30

cgt Arg	aac Asn	cca Pro	gag Glu	cac His	ggc Gly	gat Asp	Tyr	gcc Ala	acc Thr	aac Asn	att Ile	Ala	ttg Leu	cag Gln	gtg Val	259
gct Ala	aaa Lys 55	40 aag Lys	gtc Val	ggt Gly	cag Gln	aac Asn 60	45 cct Pro	cgg Arg	gat Asp	ttg Leu	gct Ala 65	50 acc Thr	tgg Trp	ctg Leu	gca Ala	307
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ga As	c aaa p Lys 295	: Asp	cgc Arg	gtg Val	gtg Val	atc Ile 300	Lys	tct Ser	gac Asp	ggc Gly	gac Asp 305	gca Ala	gcc Ala	tac Tyr	atc Ile	1027
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535

540

545

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Ile Ala Leu Gln Val Ala Lys Lys Val Gly Gln Asn Pro Arg Asp Leu 50 60

Ala Thr Trp Leu Ala Glu Ala Leu Ala Ala Asp Asp Ala Ile Asp Ser 65 70 75 80

Ala Glu Ile Ala Gly Pro Gly Phe Leu Asn Ile Arg Leu Ala Ala Ala 85 90 95

Ala Gl
n Gly Glu Ile Val Ala Lys Ile Leu Ala Gl
n Gly Glu Thr Phe 100 $$ 105 $$ 110

Gly Asn Ser Asp His Leu Ser His Leu Asp Val Asn Leu Glu Phe Val

Ser Ala Asn Pro Thr Gly Pro Ile His Leu Gly Gly Thr Arg Trp Ala 130 135 140

Ala Val Gly Asp Ser Leu Gly Arg Val Leu Glu Ala Ser Ser Ala Lys 145 150 155 160

Val Thr Arg Glu Tyr Tyr Phe Asn Asp His Gly Arg Gln Ile Asp Arg 165 170 175

Phe Ala Leu Ser Leu Leu Ala Ala Lys Gly Glu Pro Thr Pro Glu 180 185 190

Asp Gly Tyr Gly Gly Glu Tyr Ile Lys Glu Ile Ala Glu Ala Ile Val 195 200 205

Glu Lys His Pro Glu Ala Leu Ala Leu Glu Pro Ala Ala Thr Gln Glu 210 215 220

Leu Phe Arg Ala Glu Gly Val Glu Met Met Phe Glu His Ile Lys Ser 235 230 235

Ser Leu His Glu Phe Gly Thr Asp Phe Asp Val Tyr Tyr His Glu Asn 245 250 Ser Leu Phe Glu Ser Gly Ala Val Asp Lys Ala Val Gln Val Leu Lys Asp Asn Gly Asn Leu Tyr Glu Asn Glu Gly Ala Trp Trp Leu Arg Ser Thr Glu Phe Gly Asp Asp Lys Asp Arg Val Val Ile Lys Ser Asp Gly 295 Asp Ala Ala Tyr Ile Ala Gly Asp Ile Ala Tyr Val Ala Asp Lys Phe Ser Arg Gly His Asn Leu Asn Ile Tyr Met Leu Gly Ala Asp His His 330 Gly Tyr Ile Ala Arg Leu Lys Ala Ala Ala Ala Leu Gly Tyr Lys 345 Pro Glu Gly Val Glu Val Leu Ile Gly Gln Met Val Asn Leu Leu Arg 360 Asp Gly Lys Ala Val Arg Met Ser Lys Arg Ala Gly Thr Val Val Thr 375 Leu Asp Asp Leu Val Glu Ala Ile Gly Ile Asp Ala Ala Arg Tyr Ser 395 Leu Ile Arg Ser Ser Val Asp Ser Ser Leu Asp Ile Asp Leu Gly Leu 410 Trp Glu Ser Gln Ser Ser Asp Asn Pro Val Tyr Tyr Val Gln Tyr Gly 425 His Ala Arg Leu Cys Ser Ile Ala Arg Lys Ala Glu Thr Leu Gly Val 435 Thr Glu Glu Gly Ala Asp Leu Ser Leu Leu Thr His Asp Arg Glu Gly Asp Leu Ile Arg Thr Leu Gly Glu Phe Pro Ala Val Val Lys Ala Ala 475 Ala Asp Leu Arg Glu Pro His Arg Ile Ala Arg Tyr Ala Glu Glu Leu 485 Ala Gly Thr Phe His Arg Phe Tyr Asp Ser Cys His Ile Leu Pro Lys 505 Val Asp Glu Asp Thr Ala Pro Ile His Thr Ala Arg Leu Ala Leu Ala Ala Ala Thr Arg Gln Thr Leu Ala Asn Ala Leu His Leu Val Gly Val 530 540 Ser Ala Pro Glu Lys Met

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	cct Pro 135															547
	ggt Gly															595
	ttc Phe															643
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330

Glu Trp Ala Lys Gln Arg Gly Ala Lys Gly Leu Ala Tyr Ile Leu Val 340 345 350

Gly Glu Asp Gly Glu Leu Ser Gly Pro Val Ala Lys Asn Ile Thr Asp 355 360 365

Ala Glu Arg Ala Gly Ile Ala Ala His Val Gly Ala Gln Pro Gly Asp 370 375 380

Cys Ile Phe Phe Ala Ala Gly Asp Thr Lys Ser Ser Leu Ala Leu Leu 385 390 395 400

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Gly Asp Trp Ala Phe Thr Trp Ile Val Asp Ala Pro Met Phe Glu Pro 420 425 430

Ala Ala Asp Ala Thr Ala Ser Gly Asp Val Ala Leu Gly Asn Ser Lys 435 440 445

Trp Thr Ala Val His His Ala Phe Thr Ser Pro Lys Pro Glu Phe Leu 450 455 460

Asp Asn Phe Asp Thr Asn Pro Gly Asp Ala Leu Ala Tyr Ala Tyr Asp 465 470 475 480

Ile Val Cys Asn Gly Asn Glu Ile Gly Gly Gly Ser Ile Arg Ile His
485 490 495

Gln Arg Asp Val Gln Glu Arg Val Phe Glu Val Met Gly Ile Thr Gly 500 505 510

Glu Glu Ala Arg Glu Lys Phe Gly Phe Leu Leu Asp Ala Phe Ala Phe 515 520 525

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Val His Tyr Val Gln Asn Ile Thr Asp Val Asp Asp Pro Leu Phe Glu
85 90 95

Arg Ala Ala Arg Asp Gly Val Asp Trp Arg Asp Leu Gly Thr Ser Gln
100 105 110

Ile Asn Leu Phe Arg Ser Asp Met Glu Ala Leu Ser Ile Ile Pro Pro 115 120 125

Lys Asp Tyr Ile Gly Ala Ile Glu Ser Ile Asp Glu Val Ile Glu Met 130 135 140

Val Lys Thr Leu Leu Asp Glu Gly Ala Ala Tyr Ile Val Glu Asp Ala 145 150 155 160

Glu Tyr Pro Asp Val Tyr Ala Ser Ile Asn Ala Thr Asp Lys Phe Gly
165 170 175

Tyr Glu Ser Asn Tyr Asp Ala Ala Thr Met Ala Glu Phe Phe Ala Glu 180 185 190

Arg Gly Gly Asp Pro Glu Arg Pro Gly Lys Lys Asn Pro Met Asp Ala 195 200 205

Leu Leu Trp Arg Ala Ala Arg Glu Gly Glu Pro Ser Trp Glu Ser Pro 210 215 220

Phe Gly Ala Gly Arg Pro Gly Trp His Ile Glu Cys Ser Ala Ile Ala 225 230 235 240

Thr Asn Arg Leu Gly His Ser Phe Asp Ile Gln Gly Gly Gly Ser Asp 245 250 255

Leu Ile Phe Pro His His Glu Phe Ser Ala Ala His Ala Glu Ala Ala 260 265 270

His Gly Val Glu Arg Met Ala Lys His Tyr Val His Ala Gly Met Ile 275 280 285

Ser Gln Asp Gly Val Lys Met Ser Lys Ser Leu Gly Asn Leu Glu Phe 290 295 300

Val Ser Arg Leu Thr Ala Ala Gly His Glu Pro Gly Ala Ile Arg Leu

305 310 315 320 Gly Val Phe Ala Asn His Tyr Arg Gly Asn Arg Asp Trp Asn Ala Glu 325 Ser Leu Ala Thr Ala Glu Gln Arg Leu Ala Thr Trp Arg Glu Ala Ala Arg Ala Ala Thr Asn Arg Glu Asp Ala Ile Ala Val Val Glu Gln Leu Arg Ala His Leu Ser Ala Asp Leu Asp Thr Pro Gly Ala Leu Ala Ala 375 Val Asp Asn Trp Ala Ala Gly Ile Asp Thr Thr Thr Asp Ser Lys Glu 395 Phe Thr Glu Val Gly Asn Ile Val Val Ala Ala Ile Asp Ala Leu Leu 405 Gly Val Gln Leu 420 <210> 289 <211> 1532 <212> DNA <213> Corynebacterium glutamicum <220> <221> CDS <222> (1)..(1509) <223> RXA01124 <400> 289 cgg tgg gtg cgg gct att aac atg gcc tgc atg act gat gtt cgt gtt 48 Arg Trp Val Arg Ala Ile Asn Met Ala Cys Met Thr Asp Val Arg Val cgt ttc tgc cca tcg ccc acc ggc acc cca cac gtt gga ctt gtg cgc 96 Arg Phe Cys Pro Ser Pro Thr Gly Thr Pro His Val Gly Leu Val Arg 20 ace geg etg tte aae tgg gea tat get ege eae aet gga gge aag tta 144 Thr Ala Leu Phe Asn Trp Ala Tyr Ala Arg His Thr Gly Gly Lys Leu gtt ttc cgc att gag gac act gac gct gcc cgc gat tcc gag gag tct 192 Val Phe Arg Ile Glu Asp Thr Asp Ala Ala Arg Asp Ser Glu Glu Ser 55 tac tee gee ate ate gat tee etg ege tgg ttg gga atg gae tgg gat 240 Tyr Ser Ala Ile Ile Asp Ser Leu Arg Trp Leu Gly Met Asp Trp Asp 70 gag ggt gtg gaa aag ggc ggc ccg cat gag ccc tac cgc cag tcg cag Glu Gly Val Glu Lys Gly Gly Pro His Glu Pro Tyr Arg Gln Ser Gln cgc aag gac atc tat cag gat gtg ttg aag cag ctt atc gac gcc ggt Arg Lys Asp Ile Tyr Gln Asp Val Leu Lys Gln Leu Ile Asp Ala Gly

100 105 110 gaa gtc tac cca gct tat tcc acc gcg gaa gag gtt gag gag cga cac 384 Glu Val Tyr Pro Ala Tyr Ser Thr Ala Glu Glu Val Glu Glu Arg His 120 aag get get gge ege gat eea aag ete gge tae gae aae ttt gae egt 432 Lys Ala Ala Gly Arg Asp Pro Lys Leu Gly Tyr Asp Asn Phe Asp Arg 135 gat ctc acc gaa gag cag gtc gca gca ttt gag gct gag ggg cgt aag 480 Asp Leu Thr Glu Glu Gln Val Ala Ala Phe Glu Ala Glu Gly Arg Lys 150 155 cct gtg tgg cgt ctg cgc atg cca gag cag gat tgg aag tgg act gac 528 Pro Val Trp Arg Leu Arg Met Pro Glu Gln Asp Trp Lys Trp Thr Asp 165 170 ctg gtc cgc ggt gaa gtt gag ttc aag tcg ttc acc cag cct gac ttc 576 Leu Val Arg Gly Glu Val Glu Phe Lys Ser Phe Thr Gln Pro Asp Phe 180 gtg gtt gct cgt tcc aac ggt gag cct ttg tac acc ctg gtc aac cct 624 Val Val Ala Arg Ser Asn Gly Glu Pro Leu Tyr Thr Leu Val Asn Pro 195 200 gtt gat gat gcg ttg atg gaa gtc acc cat gtg ctg cgt ggt gag gat 672 Val Asp Asp Ala Leu Met Glu Val Thr His Val Leu Arg Gly Glu Asp 210 215 ctt ttg cca tcg act cct cgt cag ctt gct ctg tat gag gcg ctc aag 720 Leu Leu Pro Ser Thr Pro Arg Gln Leu Ala Leu Tyr Glu Ala Leu Lys 225 230 cgc att ggc gtg gca aag gcc acc cca gcc ttt ggt cac ctg cca ttt 768 Arg Ile Gly Val Ala Lys Ala Thr Pro Ala Phe Gly His Leu Pro Phe 250 gtg atg ggt gag ggc aac aag aag ctg tct aag cgt gat cca cag tcc 816 Val Met Gly Glu Gly Asn Lys Lys Leu Ser Lys Arg Asp Pro Gln Ser 260 age etg tte aac cae egt gae aac gge ate ate eea gag gge atg ete 864 Ser Leu Phe Asn His Arg Asp Asn Gly Ile Ile Pro Glu Gly Met Leu 275 aac tac ctg gcg ctg ctg ggt tgg tca ctg tct gct gat cag gac att 912 Asn Tyr Leu Ala Leu Leu Gly Trp Ser Leu Ser Ala Asp Gln Asp Ile 290 ttc ggt gtc gat gag ttg atc gct aac ttt gat gtc gct gac gtg ttg 960 Phe Gly Val Asp Glu Leu Ile Ala Asn Phe Asp Val Ala Asp Val Leu 305 310 ggc aac cca gct cgc ttt gac cag aag aag ctt gag gcc atc aac gcg 1008 Gly Asn Pro Ala Arg Phe Asp Gln Lys Lys Leu Glu Ala Ile Asn Ala gat cac atc cga ctt ctg gag cct aag gat ttc gag gct cgc ctg cgc Asp His Ile Arg Leu Leu Glu Pro Lys Asp Phe Glu Ala Arg Leu Arg 345

gcg Ala	tac Tyr	atg Met 355	Thr	gag Glu	tac Tyr	acc Thr	gag Glu 360	ttc Phe	cca Pro	gcg Ala	gat Asp	tac Tyr 365	cca Pro	gct Ala	gag Glu	1104
aag Lys	ttt Phe 370	gcc Ala	att Ile	gct Ala	gcg Ala	gag Glu 375	ctg Leu	gtt Val	cag Gln	acc Thr	cgc Arg 380	atc Ile	aag Lys	gtg Val	ctc Leu	1152
agc Ser 385	gag Glu	gcg Ala	tgg Trp	gat Asp	ctg Leu 390	ctg Leu	aag Lys	ttc Phe	ctg Leu	gtc Val 395	acc Thr	gct Ala	gac Asp	gaa Glu	gat Asp 400	1200
ctg Leu	gtg Val	ttc Phe	aat Asn	gag Glu 405	aag Lys	gct Ala	gcc Ala	aag Lys	aag Lys 410	aac Asn	ctc Leu	aag Lys	gag Glu	acc Thr 415	gct Ala	1248
gtt Val	gag Glu	cct Pro	ctc Leu 420	aac Asn	gcc Ala	ggt Gly	atc Ile	gca Ala 425	gcg Ala	ctg Leu	gag Glu	gca Ala	gtg Val 430	gag Glu	gag Glu	1296
tgg Trp	acc Thr	act Thr 435	cca Pro	aac Asn	att Ile	gaa Glu	gca Ala 440	gca Ala	ttg Leu	aac Asn	aag Lys	gct Ala 445	ctc Leu	att Ile	gag Glu	1344
gat Asp	cta Leu 450	ggc Gly	ctg Leu	aag Lys	cct Pro	cgc Arg 455	gtg Val	gcg Ala	ttc Phe	ggt Gly	gcg Ala 460	ttg Leu	cgc Arg	att Ile	ggt Gly	1392
atc Ile 465	tcc Ser	ggc Gly	gag Glu	gct Ala	gta Val 470	tcc Ser	cca Pro	cca Pro	ctg Leu	ttt Phe 475	gag Glu	tcc Ser	atg Met	gag Glu	ctt Leu 480	1440
ttg Leu	ggc Gly	aag Lys	gaa Glu	tcc Ser 485	acg Thr	ttg. Leu	gtt Val	cgt Arg	ctg Leu 490	aag Lys	gtt Val	act Thr	cgt Arg	gag Glu 495	cag Gln	1488
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<210> 290

<211> 503

<212> PRT

<213> Corynebacterium glutamicum

<400> 290

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Thr Ala Leu Phe Asn Trp Ala Tyr Ala Arg His Thr Gly Gly Lys Leu 35 40 45

Val Phe Arg Ile Glu Asp Thr Asp Ala Ala Arg Asp Ser Glu Glu Ser 50 55 60

Tyr Ser Ala Ile Ile Asp Ser Leu Arg Trp Leu Gly Met Asp Trp Asp

65 70 75 80 Glu Gly Val Glu Lys Gly Gly Pro His Glu Pro Tyr Arg Gln Ser Gln Arg Lys Asp Ile Tyr Gln Asp Val Leu Lys Gln Leu Ile Asp Ala Gly Glu Val Tyr Pro Ala Tyr Ser Thr Ala Glu Glu Val Glu Glu Arg His Lys Ala Ala Gly Arg Asp Pro Lys Leu Gly Tyr Asp Asn Phe Asp Arg Asp Leu Thr Glu Glu Gln Val Ala Ala Phe Glu Ala Glu Gly Arg Lys 150 155 Pro Val Trp Arg Leu Arg Met Pro Glu Gln Asp Trp Lys Trp Thr Asp 165 170 Leu Val Arg Gly Glu Val Glu Phe Lys Ser Phe Thr Gln Pro Asp Phe 185 Val Val Ala Arg Ser Asn Gly Glu Pro Leu Tyr Thr Leu Val Asn Pro 200 Val Asp Asp Ala Leu Met Glu Val Thr His Val Leu Arg Gly Glu Asp 215 Leu Leu Pro Ser Thr Pro Arg Gln Leu Ala Leu Tyr Glu Ala Leu Lys 230 235 Arg Ile Gly Val Ala Lys Ala Thr Pro Ala Phe Gly His Leu Pro Phe 245 Val Met Gly Glu Gly Asn Lys Lys Leu Ser Lys Arg Asp Pro Gln Ser 260 265 Ser Leu Phe Asn His Arg Asp Asn Gly Ile Ile Pro Glu Gly Met Leu 280 Asn Tyr Leu Ala Leu Leu Gly Trp Ser Leu Ser Ala Asp Gln Asp Ile 290 295 Phe Gly Val Asp Glu Leu Ile Ala Asn Phe Asp Val Ala Asp Val Leu Gly Asn Pro Ala Arg Phe Asp Gln Lys Lys Leu Glu Ala Ile Asn Ala 325 Asp His Ile Arg Leu Leu Glu Pro Lys Asp Phe Glu Ala Arg Leu Arg Ala Tyr Met Thr Glu Tyr Thr Glu Phe Pro Ala Asp Tyr Pro Ala Glu 360 Lys Phe Ala Ile Ala Ala Glu Leu Val Gln Thr Arg Ile Lys Val Leu Ser Glu Ala Trp Asp Leu Leu Lys Phe Leu Val Thr Ala Asp Glu Asp 390 395

Leu Val Phe Asn Glu Lys Ala Ala Lys Lys Asn Leu Lys Glu Thr Ala 405 Val Glu Pro Leu Asn Ala Gly Ile Ala Ala Leu Glu Ala Val Glu Glu 425 Trp Thr Thr Pro Asn Ile Glu Ala Ala Leu Asn Lys Ala Leu Ile Glu 440 Asp Leu Gly Leu Lys Pro Arg Val Ala Phe Gly Ala Leu Arg Ile Gly 455 Ile Ser Gly Glu Ala Val Ser Pro Pro Leu Phe Glu Ser Met Glu Leu 470 Leu Gly Lys Glu Ser Thr Leu Val Arg Leu Lys Val Thr Arg Glu Gln 485 490 Thr Pro Phe Val Val Ala Glu 500 <210> 291 <211> 736 <212> DNA <213> Corynebacterium glutamicum <220> <221> CDS <222> (101)..(736) <223> RXN00458 <400> 291 cacccctgaa aacctcctca actatcccgg agtgatcatc tccaccgttc aggagaaccc 60 atccgaaaca tggcggcaag tgaacatcta atctagaaac atg gca gga cga tac Met Ala Gly Arg Tyr gca cca tca cca agc ggc gac ctt cac ttt ggc aac ctc cgc aca gca Ala Pro Ser Pro Ser Gly Asp Leu His Phe Gly Asn Leu Arg Thr Ala 10 ctg ctg gcc tgg ctg ttc gcg cgc tcc gaa gga aaa aaa ttc ctc atg Leu Leu Ala Trp Leu Phe Ala Arg Ser Glu Gly Lys Lys Phe Leu Met 25 cgg gtc gaa gac atc gat gaa caa cgc tca tcc aag gaa tcc gcc gaa Arg Val Glu Asp Ile Asp Glu Gln Arg Ser Ser Lys Glu Ser Ala Glu 40 age caa ete gea gae eta tee gee etg ggt ete gat tgg gat gge gae Ser Gln Leu Ala Asp Leu Ser Ala Leu Gly Leu Asp Trp Asp Gly Asp 55 gto etc tac caa tec aca ege tac gac gec tac ege gea gec ett gaa 355 Val Leu Tyr Gln Ser Thr Arg Tyr Asp Ala Tyr Arg Ala Ala Leu Glu 70 75 aaa cta gac acc tac gaa tgt tat tgc tcg cgc cgg gac atc caa gaa

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Lys	s Le	ı Ası	o Thi	r Ty:	r Glu	ı Cys	5 Tyr	Cys	Ser 95	arç	g Arç	J Asp	Ile	Gln 100	Glu	
gco Ala	tco Sei	g egg Arg	g gca g Ala 105	a Pro	c cat o His	gto Val	g gct Alæ	ccg Pro 110	· Gly	ı gtç Val	tat Tyr	ccg Pro	gga Gly 115	Thr	tgt Cys	451
agç Arç	gga Gly	tto Lei 120	и Гл	g gaç Glu	g gag ı Glu	gaa Glu	cgc Arg 125	Val	gaa Glu	aag Lys	cgt Arg	gca Ala 130	acc Thr	ttg Leu	gct Ala	499
gcg Ala	Gln 135	Asn	c cgg Arg	cac His	ccc Pro	gcc Ala 140	Ile	cgc Arg	ctg Leu	cgc Arg	gcg Ala 145	cag Gln	gta Val	acc Thr	tcg Ser	547
ttt Phe 150	ASD	ttt Phe	cac His	gac Asp	cga Arg 155	Leu	cgc Arg	ggc	cca Pro	caa Gln 160	act Thr	ggc Gly	ccc Pro	gta Val	gac Asp 165	595
gat Asp	ttc Phe	att Ile	ctg Leu	ctc Leu 170	cgc Arg	ggc	G] À ààà	cag Gln	gaa Glu 175	ccc Pro	gga Gly	tgg Trp	gca Ala	tac Tyr 180	aac Asn	643
tta Leu	act Thr	gtc Val	gtc Val 185	gtc Val	gac Asp	gat Asp	gcc Ala	tac Tyr 190	caa Gln	ggc Gly	gtt Val	gac Asp	cag Gln 195	gta Val	gtc Val	691
cgc Arg	ggc Gly	gac Asp 200	gac Asp	cta Leu	ctc Leu	gaa Glu	ttc Phe 205	ggc Gly	gcg Ala	cgc Arg	caa Gln	gct Ala 210	acc Thr	ttg Leu		736
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Lys	Lys	Phe 35	Leu	Met	Arg	Val	Glu 40	Asp	Ile	Asp	Glu	Gln 45	Arg	Ser	Ser	
Lys	Glu 50	Ser	Ala	Glu	Ser	Gln 55	Leu	Ala	Asp	Leu	Ser 60	Ala	Leu	Gly	Leu	
Asp 65	Trp	Asp	Gly	Asp	Val 70	Leu	Tyr	Gln	Ser	Thr 75	Arg	Tyr	Asp	Ala	Tyr 80	
Arg	Ala	Ala	Leu	Glu 85	Lys	Leu	Asp	Thr	Tyr 90	Glu	Cys	Tyr	Cys	Ser 95	Arg	
Arg	Asp	Ile	Gln 100	Glu	Ala	Ser	Arg	Ala 105	Pro	His	Val	Ala	Pro 110	Gly	Val	
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<211> 76 <212> PRT

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<213> Corynebacterium glutamicum

<400> 294

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Lys Lys Phe Leu Met Arg Val Glu Asp Ile Asp Glu Gln Arg Ser Phe 35 40 45

Lys Glu Ser Ala Glu Ser Gln Leu Ala Asp Leu Ser Ala Leu Gly Leu 50 55 60

Asp Trp Asp Gly Asp Val Leu Tyr Gln Ser Thr Arg
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<211> 1506

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<220>

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<223> RXA00069

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- ccc tgt ggt gag atc tac ggc ggt acc cgc tct gcg tgg gac tac ggc 211
 Pro Cys Gly Glu Ile Tyr Gly Gly Thr Arg Ser Ala Trp Asp Tyr Gly
 25 30 35
- ccg ctg ggt gtg gag ctg aag gaa aac atc aag cgc cag tgg tgg cgt
 Pro Leu Gly Val Glu Leu Lys Glu Asn Ile Lys Arg Gln Trp Trp Arg
 40
 45
 50
- tct atg gtt act tcc cgc cca gat gtt gtg ggt gtt gat act tct gtc 307 Ser Met Val Thr Ser Arg Pro Asp Val Val Gly Val Asp Thr Ser Val 55 60 65
- atc ctt cct cgc cag gtg tgg gta act tcc ggc cac gtt gag gtc ttc

 Ile Leu Pro Arg Gln Val Trp Val Thr Ser Gly His Val Glu Val Phe
 70 80 85
- act gac cca ctg gtt gag tct ttg aac acc cac aag cgt tac cgt gcg 403 Thr Asp Pro Leu Val Glu Ser Leu Asn Thr His Lys Arg Tyr Arg Ala 90 95 100
- gac cac ctg ctg gag cag tac gaa gag aag cat ggt cac cca cct gta 451

					,											
Asp	His	Leu	Leu 105		Gln	Tyr	Glu	Glu 110	Lys	His	Gly	His	Pro 115	Pro	Val	
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tgg Trp	act Thr 135	gag Glu	cct Pro	aag Lys	gcg Ala	ttc Phe 140	tct Ser	ggt Gly	ctt Leu	ctg Leu	aag Lys 145	act Thr	ttc Phe	ttg Leu	gga Gly	547
cct Pro 150	gtg Val	gac Asp	gac Asp	gaa Glu	gag Glu 155	ggt Gly	ctg Leu	cac His	tac Tyr	ctg Leu 160	cgc Arg	cct Pro	gaa Glu	act Thr	gct Ala 165	595
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gag Glu	atg Met 215	gag Glu	ttc Phe	ttc Phe	gtc Val	aag Lys 220	cct Pro	ggt Gly	gag Glu	gac Asp	gaa Glu 225	gag Glu	tgg Trp	cac His	cag Gln	787
cac His 230	tgg Trp	att Ile	gat Asp	act Thr	cgc Arg 235	ctg Leu	cag Gln	tgg Trp	tac Tyr	atc Ile 240	aac Asn	ctg Leu	ggc Gly	att Ile	aag Lys 245	835
cct Pro	gag Glu	aac Asn	ctg Leu	cgt Arg 250	ctg Leu	tac Tyr	gag Glu	cac His	cct Pro 255	cag Gln	gag Glu	aag Lys	ctg Leu	tct Ser 260	cac His	883
tac Tyr	tcc Ser	aag Lys	cgc Arg 265	act Thr	gtt Val	gat Asp	att Ile	gag Glu 270	tac Tyr	gca Ala	ttc Phe	aac Asn	ttt Phe 275	gct Ala	aac Asn	931
acc Thr	aag Lys	tgg Trp 280	ggc Gly	gag Glu	ttg Leu	gag Glu	999 Gly 285	atc Ile	gcg Ala	aac Asn	cgt Arg	act Thr 290	gat Asp	tac Tyr	gat Asp	979
ctt Leu	cgc Arg 295	gtg Val	cac His	tct Ser	gag Glu	ggc Gly 300	tct Ser	ggt Gly	gag Glu	gac Asp	ctg Leu 305	tca Ser	ttc Phe	ttc Phe	gat Asp	1027
cag Gln 310	gag Glu	acc Thr	aat Asn	gag Glu	cgt Arg 315	tgg Trp	att Ile	cct Pro	ttc Phe	gta Val 320	atc Ile	gag Glu	cct Pro	gct Ala	gca Ala 325	1075
ggt Gly	ctt Leu	ggt Gly	cgc Arg	gca Ala 330	atg Met	atg Met	atg Met	ttc Phe	ctg Leu 335	atg Met	gat Asp	gct Ala	tat Tyr	cac His 340	gag Glu	1123
gac Asp	gaa Glu	gca Ala	cca Pro	aac Asn	tca Ser	aag Lys	ggt Gly	ggc Gly	gtc Val	gat Asp	aag Lys	cgt Arg	gtt Val	gtt Val	ctg Leu	1171

345 350 aag ctt gac cgt cgc ctt gcg ccg gtt aag gtt gcg gtc ttg ccg ctg 1219 Lys Leu Asp Arg Arg Leu Ala Pro Val Lys Val Ala Val Leu Pro Leu 360 365 tca aag aag gac act ttg acg cct ttg gcg gaa aag ctc gca gca gag 1267 Ser Lys Lys Asp Thr Leu Thr Pro Leu Ala Glu Lys Leu Ala Ala Glu 380 ctg cgt gaa ttc tgg aac gtt gat tac gac act tca ggt gcg att ggt 1315 Leu Arg Glu Phe Trp Asn Val Asp Tyr Asp Thr Ser Gly Ala Ile Gly 390 395 cgc cgt tac cgt cgt cag gac gag atc ggt act cca ttc tgc gtc acc 1363 Arg Arg Tyr Arg Arg Gln Asp Glu Ile Gly Thr Pro Phe Cys Val Thr 410 415 gtt gac ttt gat tet ete gag gae aae get gtg ace gtg egt gag ege 1411 Val Asp Phe Asp Ser Leu Glu Asp Asn Ala Val Thr Val Arg Glu Arg 425 430 gac acc atg gag cag gtt cgt gtt cca ctt gat gag ctg cag ggt tac 1459 Asp Thr Met Glu Gln Val Arg Val Pro Leu Asp Glu Leu Gln Gly Tyr 445 ttg gct cag cgc ctc atc ggc tgc taaacggcaa ccaatagagc gat 1506 Leu Ala Gln Arg Leu Ile Gly Cys 455 <210> 296 <211> 461 <212> PRT <213> Corynebacterium glutamicum <400> 296 Val Ala Gln Gln Ser Ile Ile Asp Thr Val Val Asn Leu Cys Lys Arg Arg Gly Leu Val Tyr Pro Cys Gly Glu Ile Tyr Gly Gly Thr Arg Ser 25 Ala Trp Asp Tyr Gly Pro Leu Gly Val Glu Leu Lys Glu Asn Ile Lys Arg Gln Trp Trp Arg Ser Met Val Thr Ser Arg Pro Asp Val Val Gly Val Asp Thr Ser Val Ile Leu Pro Arg Gln Val Trp Val Thr Ser Gly 65 75 His Val Glu Val Phe Thr Asp Pro Leu Val Glu Ser Leu Asn Thr His Lys Arg Tyr Arg Ala Asp His Leu Leu Glu Gln Tyr Glu Glu Lys His 100 Gly His Pro Pro Val Asn Gly Leu Ala Asp Ile Asn Asp Pro Glu Thr 120

Gly Gln Pro Gly Asn Trp Thr Glu Pro Lys Ala Phe Ser Gly Leu Leu 135 Lys Thr Phe Leu Gly Pro Val Asp Asp Glu Glu Gly Leu His Tyr Leu 155 Arg Pro Glu Thr Ala Gln Gly Ile Phe Val Asn Phe Lys Asn Val Met Asn Thr Ser Arg Met Lys Pro Pro Phe Gly Ile Ala Asn Ile Gly Lys 185 Ser Phe Arg Asn Glu Ile Thr Pro Gly Asn Phe Ile Phe Arg Thr Arg Glu Phe Glu Gln Met Glu Met Glu Phe Phe Val Lys Pro Gly Glu Asp 215 Glu Glu Trp His Gln His Trp Ile Asp Thr Arg Leu Gln Trp Tyr Ile 235 Asn Leu Gly Ile Lys Pro Glu Asn Leu Arg Leu Tyr Glu His Pro Gln 250 Glu Lys Leu Ser His Tyr Ser Lys Arg Thr Val Asp Ile Glu Tyr Ala 265 Phe Asn Phe Ala Asn Thr Lys Trp Gly Glu Leu Glu Gly Ile Ala Asn Arg Thr Asp Tyr Asp Leu Arg Val His Ser Glu Gly Ser Gly Glu Asp Leu Ser Phe Phe Asp Gln Glu Thr Asn Glu Arg Trp Ile Pro Phe Val 315 Ile Glu Pro Ala Ala Gly Leu Gly Arg Ala Met Met Phe Leu Met Asp Ala Tyr His Glu Asp Glu Ala Pro Asn Ser Lys Gly Gly Val Asp Lys Arg Val Val Leu Lys Leu Asp Arg Leu Ala Pro Val Lys Val Ala Val Leu Pro Leu Ser Lys Lys Asp Thr Leu Thr Pro Leu Ala Glu 370 Lys Leu Ala Ala Glu Leu Arg Glu Phe Trp Asn Val Asp Tyr Asp Thr Ser Gly Ala Ile Gly Arg Arg Tyr Arg Arg Gln Asp Glu Ile Gly Thr 405 410 Pro Phe Cys Val Thr Val Asp Phe Asp Ser Leu Glu Asp Asn Ala Val Thr Val Arg Glu Arg Asp Thr Met Glu Gln Val Arg Val Pro Leu Asp Glu Leu Gln Gly Tyr Leu Ala Gln Arg Leu Ile Gly Cys

163

211

259

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gac Asp 70	gta Val	gtg Val	agc Ser	aag Lys	gaa Glu 75	atg Met	tac Tyr	acc Thr	ttc Phe	gct Ala 80	gat Asp	cgt Arg	ggc Gly	gag Glu	cgc Arg 85	355
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gat Asp	atg Met	cgt Arg	gcg Ala	cat His	gag Glu	cag Gln	cac His	gat Asp	gtc Val	gca Ala	ttg Leu	gac Asp	gag Glu	gtt Val	gtg Val	1363

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1410

420

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His Ile Glu Leu Pro Ile Phe Glu Asp Thr Gly Leu Phe Ala Arg Gly 50 55 60

Val Gly Glu Ser Thr Asp Val Val Ser Lys Glu Met Tyr Thr Phe Ala 65 70 75 80

Asp Arg Gly Glu Arg Ser Val Thr Leu Arg Pro Glu Gly Thr Ala Gly 85 90 95

Val Met Arg Ala Val Ile Glu His Ser Leu Asp Arg Gly Gln Leu Pro $100 \hspace{1cm} 105 \hspace{1cm} 110 \hspace{1cm}$

Val Lys Leu Asn Tyr Ala Gly Pro Phe Phe Arg Tyr Glu Arg Pro Gln
115 120 125

Ala Gly Arg Tyr Arg Gln Leu Gln Gln Val Gly Val Glu Ala Ile Gly 130 140

Ser Tyr Arg Ser Leu Gly Leu Gln Asp Phe Arg Leu Glu Leu Thr Ser 165 170 175

Leu Gly Asp Arg His Cys Arg Pro Glu Tyr Arg Gln Lys Leu Gln Asp 180 185 190

Phe Leu Phe Ala Leu Pro Leu Asp Glu Glu Thr Arg Lys Arg Ala Glu 195 200 205

Ile Asn Pro Leu Arg Val Leu Asp Asp Lys Arg Pro Glu Val Gln Glu 210 215 220

Met Thr Ala Asp Ala Pro Leu Met Leu Asp His Leu Asp Ala Glu Cys 225 230 235 240

Arg Glu His Phe Glu Thr Val Thr Gly Leu Leu Asp Asp Met Gly Val 245 250 255

Pro Tyr Val Ile Asn Pro Arg Met Val Arg Gly Leu Asp Tyr Tyr Thr Lys Thr Cys Phe Glu Phe Val His Asp Gly Leu Gly Ala Gln Ser Gly 280 Ile Gly Gly Gly Arg Tyr Asp Gly Leu Met Ala Gln Leu Gly Gly Gln Asp Leu Ser Gly Ile Gly Tyr Gly Leu Gly Val Asp Arg Thr Met Leu Ala Leu Glu Ala Glu Gly Val Thr Val Gly Ala Glu Arg Arg Val 330 Asp Val Tyr Gly Val Pro Leu Gly Lys Asp Ala Lys Lys Ala Leu Ala Gly Ile Val Asn Thr Leu Arg Ala Ala Gly Ile Ser Thr Asp Met Ser Tyr Gly Asp Arg Gly Leu Lys Gly Ala Met Lys Gly Ala Asp Arg Ser Asn Ala Leu Tyr Thr Leu Val Leu Gly Glu Gln Glu Leu Glu Asn Asn 395 Thr Ile Ala Val Lys Asp Met Arg Ala His Glu Gln His Asp Val Ala 410 Leu Asp Glu Val Val Ala Phe Leu Gln Gly Lys Leu Ile 425 <210> 299 <211> 3057 <212> DNA <213> Corynebacterium glutamicum <220> <221> CDS <222> (101)..(3034) <223> RXA02726 <400> 299 cagegegatg gtgctgaaga ctaegtettt taegatggee eteettttge aaacggtgtg 60 ccacactacg gccacctact gactggttac gtcaaggaca ttg ttc ctt gct acc Leu Phe Leu Ala Thr aga cca tgc cgt ggg tac cgc gtt cct cgt gtc ttc agt tgg gat acc 163 Arg Pro Cys Arg Gly Tyr Arg Val Pro Arg Val Phe Ser Trp Asp Thr cac ggc ttg cca gct gaa ctt gag gct gaa aag cag ctc ggc atc aag 211 His Gly Leu Pro Ala Glu Leu Glu Ala Glu Lys Gln Leu Gly Ile Lys 30 gac aag ggc gag atc gag gcc atg ggt ctt gcc aag ttc aac gag tac 259 Asp Lys Gly Glu Ile Glu Ala Met Gly Leu Ala Lys Phe Asn Glu Tyr

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gad Asp	c tto Lei	g aaq 1 Lys	g gct s Ala	gca Ala 330	я сту	cgc Arg	gtg Val	gtt Val	cgc Arg 335	, His	caç Glr	g acc n Thr	ato Ile	gaa Glu 340	cac His	1123
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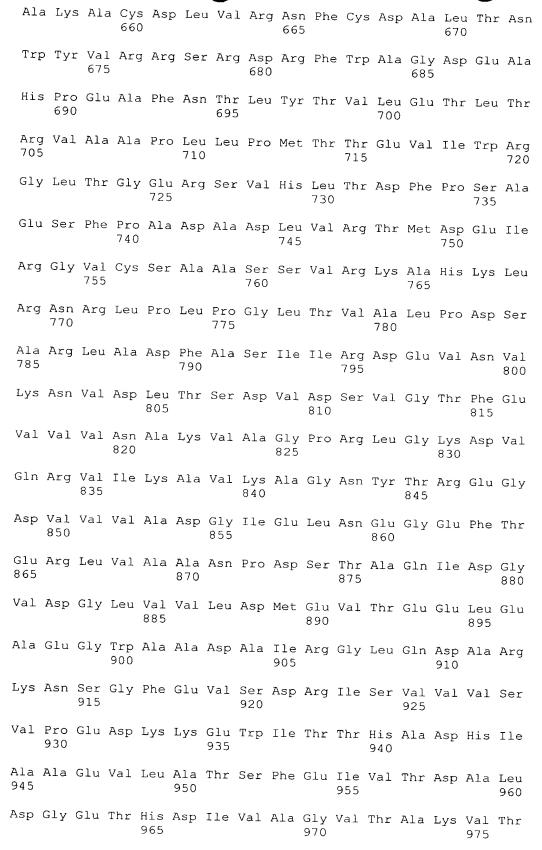
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Gln Thr Ile Glu His Ser Tyr Pro His Ser Trp Arg Ser Gly Glu Pro 345 Leu Ile Tyr Met Ala Leu Pro Ser Trp Phe Val Asn Val Thr Glu Ile 360 Arg Asp Arg Met Val Glu Val Asn Gln Asp Ile Glu Trp Met Pro Ala 375 His Ile Arg Asp Gly Gln Phe Gly Lys Trp Leu Glu Gly Ala Arg Asp 390 Trp Asn Ile Ser Arg Ser Arg Tyr Trp Gly Ser Pro Ile Pro Ala Trp Val Ser Asp Asn Asp Glu Tyr Pro Arg Val Asp Val Tyr Gly Ser Leu Asp Glu Leu Glu Ala Asp Phe Gly Val Arg Pro Lys Ser Leu His Arg Pro Asp Ile Asp Glu Leu Thr Arg Pro Asn Pro Asp Asp Pro Thr Gly 455 Lys Ser Thr Met Arg Arg Val Thr Asp Val Leu Asp Val Trp Phe Asp 470 Ser Gly Ser Met Pro Phe Ala Gln Val His Tyr Pro Phe Glu Asn Lys Glu Trp Phe Asp Thr His Ala Pro Ala Asp Phe Ile Val Glu Tyr Ile 500 Gly Gln Thr Arg Gly Trp Phe Tyr Leu Leu His Val Leu Ser Thr Ala 520 Leu Phe Asp Arg Pro Ala Phe Lys Lys Val Val Ala His Gly Ile Val 535 Leu Gly Asp Asp Gly Leu Lys Met Ser Lys Ser Lys Gly Asn Tyr Pro Asn Val Asn Glu Val Phe Asp Arg Asp Gly Ser Asp Ala Met Arg Trp Phe Leu Met Ser Ser Pro Ile Leu Arg Gly Gly Asn Leu Ile Val Thr 585 Glu Lys Gly Ile Arg Glu Gly Val Arg Gln Ala Gln Leu Pro Met Trp Asn Ala Tyr Ser Phe Leu Gln Leu Tyr Thr Ser Lys Asn Ala Thr Trp 615 Ser Val Asp Ser Thr Asp Val Leu Asp Arg Tyr Ile Leu Ala Lys Leu 635 His Asp Leu Val Ala Glu Thr Gln Ala Ala Leu Asp Gly Thr Asp Ile 645



Lys Asn

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Asp Asn Gly Thr Phe Asn Ala Pro Asn Pro Val Gly Asp Leu Ala Pro 35 40 45

Ala Asp Gly Lys Ala Leu Pro Glu Asp Lys Leu Phe Val Gln Asp Met 50 55 60

Phe Pro Tyr Pro Ser Gly Ala Gly Leu His Val Gly His Pro Leu Gly 65 70 75 80

Tyr Ile Ala Thr Asp Val Phe Ala Arg Tyr Asn Arg Met Leu Gly Lys 85 90 95

Asn Val Leu His Thr Leu Gly Tyr Asp Ala Phe Gly Leu Pro Ala Glu 100 105 110

Gln Tyr Ala Ile Gln Thr Gly Thr His Pro Arg Thr Thr Met Ala 115 120 125

Asn Ile Glu Asn Met Lys Arg Gln Leu Gly Ala Leu Gly Leu Gly His 130 135 140

Asp Ser Arg Arg Ala Val Ala Thr Thr Asp Pro Glu Phe Tyr Lys Trp 145 150 155 160

Thr Gln Trp Ile Phe Leu Gln Ile Phe Asn Ser Trp Phe Asp Ala Glu
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115

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aag Lys	atc Ile	gaa Glu	ggt Gly 25	gag Glu	tgg Trp	cag Gln	aat Asn	tac Tyr 30	tgg Trp	act Thr	gac Asp	aac Asn	ggc Gly 35	aca Thr	ttc Phe	211
aac Asn	gca Ala	ccc Pro 40	aac Asn	cca Pro	gtg Val	ggt Gly	gat Asp 45	tta Leu	gcg Ala	cct Pro	gcg Ala	gac Asp 50	ggt Gly	aaa Lys	gca Ala	259
ctt Leu	cct Pro 55	gag Glu	gac Asp	aag Lys	ctc Leu	ttt Phe 60	gtc Val	cag Gln	gat Asp	atg Met	ttc Phe 65	ccg Pro	tac Tyr	cca Pro	tcc Ser	307
gga Gly 70	gct Ala	ggc Gly	ctg Leu	cac His	gta Val 75	ggc Gly	cac His	cca Pro	ctc Leu	ggt Gly 80	tac Tyr	atc Ile	gca Ala	acg Thr	gat Asp 85	355
gtt Val	ttc Phe	gcc Ala	cgc Arg	tac Tyr 90	aac Asn	cgc Arg	atg Met	ctg Leu	ggc Gly 95	aag Lys	aac Asn	gtt Val	ctg Leu	cac His 100	acc Thr	403
ttg Leu	ggc Gly	tat Tyr	gac Asp 105	gcc Ala	ttc Phe	gga Gly	ctg Leu	cca Pro 110	gca Ala	gag Glu	cag Gln	tac Tyr	gcg Ala 115	atc Ile	caa Gln	451
acc Thr	ggt Gly	aca Thr 120	cac His	cca Pro	cgc Arg	acc Thr	acc Thr 125	acc Thr	atg Met	gcc Ala	aac Asn	att Ile 130	gag Glu	aac Asn	atg Met	499
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gtg Val 150	gcc Ala	acc Thr	acg Thr	gat Asp	cct Pro 155	gag Glu	ttc Phe	tac Tyr	aag Lys	tgg Trp 160	act Thr	cag Gln	tgg Trp	atc Ile	ttc Phe 165	595
ctg Leu	cag Gln	att Ile	ttc Phe	aat Asn 170	tcg Ser	tgg Trp	ttc Phe	gat Asp	gca Ala 175	gag Glu						628
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Asp Asn Gly Thr Phe Asn Ala Pro Asn Pro Val Gly Asp Leu Ala Pro

40 45 Ala Asp Gly Lys Ala Leu Pro Glu Asp Lys Leu Phe Val Gln Asp Met Phe Pro Tyr Pro Ser Gly Ala Gly Leu His Val Gly His Pro Leu Gly Tyr Ile Ala Thr Asp Val Phe Ala Arg Tyr Asn Arg Met Leu Gly Lys Asn Val Leu His Thr Leu Gly Tyr Asp Ala Phe Gly Leu Pro Ala Glu 100 105 Gln Tyr Ala Ile Gln Thr Gly Thr His Pro Arg Thr Thr Met Ala 115 Asn Ile Glu Asn Met Lys Arg Gln Leu Gly Ala Leu Gly Leu Gly His 130 135 Asp Ser Arg Arg Ala Val Ala Thr Thr Asp Pro Glu Phe Tyr Lys Trp Thr Gln Trp Ile Phe Leu Gln Ile Phe Asn Ser Trp Phe Asp Ala Glu 165 <210> 305 <211> 1061 <212> DNA <213> Corynebacterium glutamicum <220> <221> CDS <222> (1)..(1038) <223> RXN01061 <400> 305 atc tct cgg tac cga gag cag ttc tgc aac atc gaa aat gaa cgc tac 48 Ile Ser Arg Tyr Arg Glu Gln Phe Cys Asn Ile Glu Asn Glu Arg Tyr tgg acc ggc cca cgc cca gaa acc cac gga cca aac gat cca ggc ggc 96 Trp Thr Gly Pro Arg Pro Glu Thr His Gly Pro Asn Asp Pro Gly Gly gta gac ctc tac gtc ggt ggc gtc gag cac gca gtt ctc cac ctg ctc 144 Val Asp Leu Tyr Val Gly Gly Val Glu His Ala Val Leu His Leu Leu tac gca cgt ttc tgg cac aag gtc ctc ttc gac ctg ggc cac gtc tcc 192 Tyr Ala Arg Phe Trp His Lys Val Leu Phe Asp Leu Gly His Val Ser tee aag gag eea tae egt ege etg tae aac eag gge tae ate eag gee 240 Ser Lys Glu Pro Tyr Arg Arg Leu Tyr Asn Gln Gly Tyr Ile Gln Ala 70

					,										/	
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gaa Glu	gag Glu	aag Lys	gac Asp 100	gga Gly	aag Lys	ttc Phe	ttc Phe	tac Tyr 105	cag Gln	ggc Gly	gaa Glu	gaa Glu	gtc Val 110	aac Asn	cag Gln	336
gaa Glu	tac Tyr	gga Gly 115	aag Lys	atg Met	ggc Gly	aag Lys	tcc Ser 120	ctg Leu	aag Lys	aac Asn	gcc Ala	gtt Val 125	gcc Ala	cca Pro	gac Asp	384
gat Asp	atc Ile 130	tgc Cys	aac Asn	aac Asn	ttc Phe	ggt Gly 135	gct Ala	gac Asp	acc Thr	ctg Leu	cgc Arg 140	gtt Val	tac Tyr	gag Glu	atg Met	432
gcc Ala 145	atg Met	gga Gly	cct Pro	ttg Leu	gac Asp 150	acc Thr	tcc Ser	cgt Arg	cca Pro	tgg Trp 155	gca Ala	acc Thr	aag Lys	gac Asp	gtc Val 160	480
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gac Asp	aac Asn	aag Lys 195	caa Gln	ctg Leu	cac His	cgc Arg	acc Thr 200	atc Ile	gca Ala	ggc Gly	gtc Val	cgc Arg 205	gac Asp	gac Asp	tac Tyr	624
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aac Asn 225	tac Tyr	ctg Leu	acc Thr	aaa Lys	aca Thr 230	tac Tyr	cca Pro	gac Asp	acc Thr	atc Ile 235	cca Pro	gct Ala	ggc Gly	gca Ala	gtc Val 240	720
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gaa Glu	ctc Leu	tgg Trp	aag Lys 260	aag Lys	ctc Leu	ggc Gly	cac His	gac Asp 265	gac Asp	acc Thr	gtc Val	acc Thr	tac Tyr 270	gaa Glu	cca Pro	816
ttc Phe	ccc Pro	acc Thr 275	ttt Phe	gag Glu	gaa Glu	aaa Lys	tgg Trp 280	ctc Leu	acc Thr	gac Asp	gat Asp	gaa Glu 285	atc Ile	gaa Glu	ctg Leu	864
cca Pro	gtc Val 290	cag Gln	gtc Val	aac Asn	ggc Gly	aag Lys 295	gtc Val	cgc Arg	ggt Gly	cgc Arg	atc Ile 300	acc Thr	gtt Val	gca Ala	gcc Ala	912
gac Asp 305	gcc Ala	agc Ser	cag Gln	gag Glu	cag Gln 310	gtc Val	atc Ile	gag Glu	gca Ala	gcg Ala 315	ctt Leu	gcc Ala	gac Asp	gag Glu	aag Lys 320	960
gtg	cag	gag	caa	atc	tcc	ggc	aag	aac	ctg	atc	aag	cag	atc	gtt	gtt	1008

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Tyr Ala Arg Phe Trp His Lys Val Leu Phe Asp Leu Gly His Val Ser 50 60

Ser Lys Glu Pro Tyr Arg Arg Leu Tyr Asn Gln Gly Tyr Ile Gln Ala 65 70 75 80

Phe Ala Tyr Thr Asp Ser Arg Gly Val Tyr Val Pro Ala Asp Asp Val 85 90 95

Glu Glu Lys Asp Gly Lys Phe Phe Tyr Gln Gly Glu Glu Val Asn Gln 100 105 110

Glu Tyr Gly Lys Met Gly Lys Ser Leu Lys Asn Ala Val Ala Pro Asp 115 120 125

Asp Ile Cys Asn Asn Phe Gly Ala Asp Thr Leu Arg Val Tyr Glu Met 130 135 140

Ala Met Gly Pro Leu Asp Thr Ser Arg Pro Trp Ala Thr Lys Asp Val 145 150 155 160

Val Gly Ala Gln Arg Phe Leu Gln Arg Leu Trp Arg Leu Val Val Asp 165 170 175

Glu Asn Thr Gly Glu Val Leu Thr Arg Asp Glu Val Leu Thr Asp Asp 180 185 190

Asp Asn Lys Gln Leu His Arg Thr Ile Ala Gly Val Arg Asp Asp Tyr 195 200 205

Thr Asn Leu Arg Val Asn Thr Val Val Ala Lys Leu Ile Glu Tyr Val 210 215 220

Asn Tyr Leu Thr Lys Thr Tyr Pro Asp Thr Ile Pro Ala Gly Ala Val 225 230 235 240

Leu Pro Leu Ile Val Met Val Ser Pro Ile Ala Pro His Ile Ala Glu 245 Glu Leu Trp Lys Lys Leu Gly His Asp Asp Thr Val Thr Tyr Glu Pro 270 Phe Pro Thr Phe Glu Glu Lys Trp Leu Thr Asp Asp Glu Ile Glu Leu Pro Val Gln Val Asn Gly Lys Val Arg Gly Arg Ile Thr Val Ala Ala Asp Ala Ser Gln Glu Gln Val Ile Glu Ala Ala Leu Ala Asp Glu Lys 315 Val Gln Glu Gln Ile Ser Gly Lys Asn Leu Ile Lys Gln Ile Val Val 330 Pro Gly Arg Met Val Asn Leu Val Val Lys 340 <210> 307 <211> 471 <212> DNA <213> Corynebacterium glutamicum <220> <221> CDS <222> (1)..(471) <223> FRXA01864 <400> 307 aat gaa cgc tac tgg acc ggc cca cgc cca gaa acc cac gga cca aac 48 Asn Glu Arg Tyr Trp Thr Gly Pro Arg Pro Glu Thr His Gly Pro Asn 10 gat cca ggc ggc gta gac ctc tac gtc ggt ggc gtc gag cac gca gtt Asp Pro Gly Gly Val Asp Leu Tyr Val Gly Gly Val Glu His Ala Val ctc cac ctg ctc tac gca cgt ttc tgg cac aag gtc ctc ttc gac ctg 144 Leu His Leu Leu Tyr Ala Arg Phe Trp His Lys Val Leu Phe Asp Leu ggc cac gtc tcc tcc aag gag cca tac cgt cgc ctg tac aac cag ggc 192 Gly His Val Ser Ser Lys Glu Pro Tyr Arg Arg Leu Tyr Asn Gln Gly 5.5 tac atc cag gcc ttc gcc tac acc gat tcc cgt ggc gtc tac gtg cct 240 Tyr Ile Gln Ala Phe Ala Tyr Thr Asp Ser Arg Gly Val Tyr Val Pro gcc gat gat gtc gaa gag aag gac gga aag ttc ttc tac cag ggc gaa 288 Ala Asp Asp Val Glu Glu Lys Asp Gly Lys Phe Phe Tyr Gln Gly Glu 85 gaa gtc aac cag gaa tac gga aag atg ggc aag tcc ctg aag aac gcc 336 Glu Val Asn Gln Glu Tyr Gly Lys Met Gly Lys Ser Leu Lys Asn Ala 100 105

110

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gtt Val	tac Tyr 130	GIU	g ato Met	gco : Ala	atç Met	gga Gly 135	Pro	ttg Leu	gac Asp	acc Thr	tcc Ser 140	Arg	cca Pro	tgo Trp	g gca Ala	432
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Leu	His	Leu 35	Leu	Tyr	Ala	Arg	Phe 40	Trp	His	Lys	Val	Leu 45	Phe	Asp	Leu	
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Tyr 65	Ile	Gln	Ala	Phe	Ala 70	Tyr	Thr	Asp	Ser	Arg 75	Gly	Val	Tyr	Val	Pro 80	
Ala A	Asp	Asp	Val	Glu 85	Glu	Lys	Asp	Gly	Lys 90	Phe	Phe	Tyr	Gln	Gly 95	Glu	
Glu V	Val	Asn	Gln 100	Glu	Tyr	Gly	Lys	Met 105	Gly	Lys	Ser	Leu	Lys 110	Asn	Ala	
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Val 1	ľyr l30	Glu	Met	Ala	Met	Gly 135	Pro	Leu	Asp	Thr	Ser 140	Arg	Pro	Trp	Ala	
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tac gtc aac tac ctg acc aaa aca tac cca gac acc atc cca gct ggc Tyr Val Asn Tyr Leu Thr Lys Thr Tyr Pro Asp Thr Ile Pro Ala Gly 15 20 25	158									
gca gtc ctg cca ctg atc gtc atg gtc tcc cct atc gca cca cac atc Ala Val Leu Pro Leu Ile Val Met Val Ser Pro Ile Ala Pro His Ile 30 35 40	206									
gcg gag gaa ctc tgg aag aag ctc ggc cac gac gac acc gtc acc tac Ala Glu Glu Leu Trp Lys Lys Leu Gly His Asp Asp Thr Val Thr Tyr 45 50 55 60	254									
gaa cca ttc ccc acc ttt gag gaa aaa tgg ctc acc gac gat gaa atc Glu Pro Phe Pro Thr Phe Glu Glu Lys Trp Leu Thr Asp Asp Glu Ile 65 70 75	302									
gaa ctg cca gtc cag gtc aac ggc aag gtc cgc ggt cgc atc acc gtt Glu Leu Pro Val Gln Val Asn Gly Lys Val Arg Gly Arg Ile Thr Val 80 85 90	350									
gca gcc gac gcc agc cag gag cag gtc atc gag gca gcg ctt gcc gac Ala Ala Asp Ala Ser Gln Glu Gln Val Ile Glu Ala Ala Leu Ala Asp 95 100 105	398									
gag aag gtg cag gag caa atc tcc ggc aag aac ctg atc aag cag atc Glu Lys Val Gln Glu Gln Ile Ser Gly Lys Asn Leu Ile Lys Gln Ile 110 115 120	446									
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Trp Lys Lys Leu Gly His Asp Asp Thr Val Thr Tyr Glu Pro Phe Pro 50 55 60										
Thr Phe Glu Glu Lys Trp Leu Thr Asp Asp Glu Ile Glu Leu Pro Val 65 70 75 80										

130

Gln Val Asn Gly Lys Val Arg Gly Arg Ile Thr Val Ala Ala Asp Ala 85 Ser Gln Glu Gln Val Ile Glu Ala Ala Leu Ala Asp Glu Lys Val Gln 105 Glu Gln Ile Ser Gly Lys Asn Leu Ile Lys Gln Ile Val Val Pro Gly 120 Arg Met Val Asn Leu Val Val Lys 135 <210> 311 <211> 1002 <212> DNA <213> Corynebacterium glutamicum <220> <221> CDS <222> (1)..(1002) <223> RXA00968 <400> 311 ctg atc gat gat ctg gag ctg ctc gat tgg act gag aag gtc aag tcc 48 Leu Ile Asp Asp Leu Glu Leu Leu Asp Trp Thr Glu Lys Val Lys Ser atg cag cgt aac tgg att ggc cgt tcc cgc ggc gct gaa gtt gat ttc 96 Met Gln Arg Asn Trp Ile Gly Arg Ser Arg Gly Ala Glu Val Asp Phe agt gca gag ggc gaa acc gtc acc gtg ttt acc acc cgc cca gat act 144 Ser Ala Glu Gly Glu Thr Val Thr Val Phe Thr Thr Arg Pro Asp Thr 40 ctg ttc ggc gcg acc tac atg gtt ctt gca cct gag cat gag ctg gtc 192 Leu Phe Gly Ala Thr Tyr Met Val Leu Ala Pro Glu His Glu Leu Val gac gtg ctg ctg gag aag gct ggt tcc tac gag ggc gtt gat gcc cgt 240 Asp Val Leu Leu Glu Lys Ala Gly Ser Tyr Glu Gly Val Asp Ala Arg tgg acc aat ggc cag gcg agc cct gcg gaa gct gtc gct gca tac cgc 288 Trp Thr Asn Gly Gln Ala Ser Pro Ala Glu Ala Val Ala Ala Tyr Arg gcc tcc atc gcc gcg aag tcc gac ctg gag cgt cag gaa aac aag gaa 336 Ala Ser Ile Ala Ala Lys Ser Asp Leu Glu Arg Gln Glu Asn Lys Glu 100 aag acc ggc gtc ttc ctg ggc gtt tac gcg acc aac cca gtc aac ggc 384 Lys Thr Gly Val Phe Leu Gly Val Tyr Ala Thr Asn Pro Val Asn Gly 115 gat cag atc aca gtg ttc atc gct gac tac gtt ctg acc ggc tac ggc Asp Gln Ile Thr Val Phe Ile Ala Asp Tyr Val Leu Thr Gly Tyr Gly

135

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gcg Ala	aac Asn	gac Asp 195	aac Asn	ggc Gly	ctg Leu	gat Asp	atc Ile 200	aac Asn	ggc Gly	ctt Leu	gcc Ala	aag Lys 205	gat Asp	gag Glu	gct Ala	624
att Ile	gcc Ala 210	aag Lys	acc Thr	atc Ile	gaa Glu	tgg Trp 215	ttg Leu	gaa Glu	gaa Glu	aag Lys	gaa Glu 220	ctt Leu	ggc Gly	cgc Arg	ggc Gly	672
acc Thr 225	atc Ile	cag Gln	tac Tyr	aag Lys	ctg Leu 230	cgc Arg	gac Asp	tgg Trp	ctg Leu	ttc Phe 235	gct Ala	cgc Arg	cag Gln	cgt Arg	tac Tyr 240	720
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gct Ala	ctg Leu	cca Pro	gac Asp 260	tcc Ser	atg Met	ctt Leu	cca Pro	gtc Val 265	gag Glu	ctg Leu	cca Pro	gag Glu	gta Val 270	gag Glu	gac Asp	816
tac Tyr	aag Lys	cct Pro 275	gtc Val	tcc Ser	ttc Phe	gac Asp	cct Pro 280	gaa Glu	gac Asp	gca Ala	gac Asp	tcc Ser 285	gag Glu	cct Pro	tcc Ser	864
cca Pro	cca Pro 290	ctg Leu	gct Ala	aag Lys	gcc Ala	cgc Arg 295	gaa Glu	tgg Trp	gtt Val	gag Glu	gtg Val 300	gaa Glu	ctc Leu	gat Asp	ctc Leu	912
ggc Gly 305	gat Asp	ggc	aag Lys	aag Lys	aag Lys 310	tac Tyr	acc Thr	cgc Arg	gac Asp	acc Thr 315	aac Asn	gtc Val	atg Met	cca Pro	cag Gln 320	960
tgg Trp	gca Ala	ggt Gly	tcc Ser	tcc Ser 325	tgg Trp	tac Tyr	cag Gln	ctg Leu	cgc Arg 330	tac Tyr	gtc Val	gat Asp	cca Pro			1002
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Ser Ala Glu Gly Glu Thr Val Thr Val Phe Thr Thr Arg Pro Asp Thr 40 Leu Phe Gly Ala Thr Tyr Met Val Leu Ala Pro Glu His Glu Leu Val Asp Val Leu Leu Glu Lys Ala Gly Ser Tyr Glu Gly Val Asp Ala Arg Trp Thr Asn Gly Gln Ala Ser Pro Ala Glu Ala Val Ala Ala Tyr Arg 8.5 Ala Ser Ile Ala Ala Lys Ser Asp Leu Glu Arg Gln Glu Asn Lys Glu 100 105 Lys Thr Gly Val Phe Leu Gly Val Tyr Ala Thr Asn Pro Val Asn Gly 115 Asp Gln Ile Thr Val Phe Ile Ala Asp Tyr Val Leu Thr Gly Tyr Gly Thr Gly Ala Ile Met Ala Val Pro Ala His Asp Glu Arg Asp Tyr Glu 145 Phe Ala Thr Val Leu Gly Leu Pro Ile Lys Glu Val Val Ala Gly Gly Asn Ile Glu Glu Ala Ala Phe Thr Glu Ser Gly Glu Ala Val Asn Ser Ala Asn Asp Asn Gly Leu Asp Ile Asn Gly Leu Ala Lys Asp Glu Ala Ile Ala Lys Thr Ile Glu Trp Leu Glu Glu Lys Glu Leu Gly Arg Gly 215 Thr Ile Gln Tyr Lys Leu Arg Asp Trp Leu Phe Ala Arg Gln Arg Tyr Trp Gly Glu Pro Phe Pro Ile Val Tyr Asp Glu Asn Gly Gln Ala His Ala Leu Pro Asp Ser Met Leu Pro Val Glu Leu Pro Glu Val Glu Asp Tyr Lys Pro Val Ser Phe Asp Pro Glu Asp Ala Asp Ser Glu Pro Ser Pro Pro Leu Ala Lys Ala Arg Glu Trp Val Glu Val Glu Leu Asp Leu Gly Asp Gly Lys Lys Tyr Thr Arg Asp Thr Asn Val Met Pro Gln

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Tyr Leu Glu Val Gly Glu Glu Thr Asp Val Glu Val Ala Ile Ala Gly
70 75 80 85

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His Arg Tyr Thr Asp Leu Ile Met Arg Glu Gln Ala Arg Thr Asn Ala
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190
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C L	tc a eu T		egc a Arg I	tc a le L	ag g ys V	tc a al M	ec A	gt d rg A	gca Ala	cto	c cg u Ar	jc c. ig H.	is T	ac (yr 1	ctc Leu	ga Gl	ia ga .u As	c 739 p
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23	30		ca g la A	113	23	35	ie G	ru I	nr	HIS	24)	r As O	sn A.	la I	eu	As	p Il. 24:	e 5
		-	ac ct yr Le	25	0	.c Aı	.a ri	20 G	тu	₂₅₅	Туі	r Le	u Ly	s A	rg	Cys 260	s Val	L
		-	gc at y Il 26	5	α 71 <u>1</u>	y va	T E	2	70	vaı	Asn	n Ar	g As	n P. 2	he 75	Arc	g Asr	1
		28		, 00		L 111.	28	5	20 (JLU	Phe	e Ala	a Me 29	t Le O	eu	Glu	Thr	
_	295	5	c tg a Tr	- 01.	y 1111	300)	u Ir	ır (этЛ	Ala	Lys 305	s Le	u Il	.е	Lys	Gly	1027
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- 403 -

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547

595

619

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			20					25					30			
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Ala Gln Val Lys Val Val Leu Glu Glu Lys Arg Asn Ala Glu Val Leu 100 105 110

Glu Leu Glu Arg Val Asp Val Thr Val Pro Thr Thr Arg Glu Gln Val 115 120 125

Gly Ala Leu His Pro Ile Thr Ile Leu Asn Glu Gln Ile Ala Asp Ile 130 135 140

Phe Val Gly Met Gly Trp Glu Ile Ala Glu Gly Pro Glu Val Glu Ala 145 150 155 160

Glu Tyr Phe Asn Phe Asp Ala Leu Asn Phe Leu Pro Asp His Pro Ala 165 170 175

Arg Thr Leu Gln Asp Thr Phe His Ile Ala Pro Glu Gly Ser Arg Gln 180 185 190

Val Leu Arg Thr His Thr Ser Pro Val Gln Val Arg Thr Met Leu Asn 195 200 205

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Asp Glu Leu Asp Ala Thr His Thr Pro Val Phe His Gln Ile Glu Gly 235 230 240

Leu Ala Val Asp Lys Gly Leu Thr Met Ala His Leu Arg Gly Thr Leu 245 250 255

Asp His Leu Ala Lys Glu Leu Phe Gly Pro Glu Thr Lys Thr Arg Met 260 265 270

Arg Ser Asn Tyr Phe Pro Phe Thr Glu Pro Ser Ala Glu Val Asp Val 275 280 285

Trp Phe Pro Asn Lys Lys Gly Gly Ala Gly Trp Ile Glu Trp Gly Gly 290 295 300

Cys Gly Met Val Asn Pro Asn Val Leu Arg Ala Val Gly Val Asp Pro 305 310 315 320

Glu Glu Tyr Thr Gly Phe Ala Phe Gly Met Gly Ile Glu Arg Thr Leu 325 330 335

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cgc aac ttc aag gaa ggc gac acc gtt gtc gtg tcc ctt cct ggc gct 259 Arg Asn Phe Lys Glu Gly Asp Thr Val Val Val Ser Leu Pro Gly Ala 40 45

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135 140 145

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Ile Glu Pro Ala Val Ala Gly Ile Glu Val Lys Val Pro Ala Val Glu
150 165

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ct [.] Lei	t tto u Phe	c cad	gto Val	tto Phe 730	e Arg	tcc Ser	gaa Glu	cag Gln	cgc Arg 735	ı Gly	gag Glu	aac Asn	aag Lys	aaa Lys 740	tcc Ser	2323
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Glu 65 Leu Ser	Thr Gly Tyr Thr	Pro Tyr Leu Gly Val	Gly Gly Ala Glu 100 Phe	Ala Arg Asp 85 Pro	Val Met 70 Lys Gly Val	Leu 55 Ser Gln Glu	Pro Ala Asn Asp Val	25 Lys Gly Gly Ser Ala 105	Glu Asp Met Gly 90 Arg	Gly Phe Ile 75 Ile Gln Asp	Asp Ala 60 Cys Ile Ala Arg	Thr 45 Ile Ser Thr Leu Gly 125	30 Val Ser Ala Leu Gly 110 Tyr	Val Ala Ser Asp 95 Leu	Val Arg Glu 80 Pro Glu Leu	

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Met Ile Thr Arg Leu

1 5

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gcc cca ggt atc tac tcc tgg ttg cca ctg ggt ttg cgc gca gtg cgc 259
Ala Pro Gly Ile Tyr Ser Trp Leu Pro Leu Gly Leu Arg Ala Val Arg
40 45 50

aac att gaa gct gtc gta cgc gag gaa atg gat gcg atc gga gga cag 307

Asn Ile Glu Ala Val Val Arg Glu Glu Met Asp Ala Ile Gly Gly Gln 60 gag ctg ctc ttc cca aca ctc ctg cca cgt gag cct tat gaa acc aca 355 Glu Leu Leu Phe Pro Thr Leu Leu Pro Arg Glu Pro Tyr Glu Thr Thr cag cgt tgg aca gaa tac ggc gat tcg ctg ttc cgt ctg aag gac cgc Gln Arg Trp Thr Glu Tyr Gly Asp Ser Leu Phe Arg Leu Lys Asp Arg aag ggt gcc gac tac ctg ctc gga cca acc cac gag gaa atg ttc gcc 451 Lys Gly Ala Asp Tyr Leu Leu Gly Pro Thr His Glu Glu Met Phe Ala 110 gcc acg gtg aag gat ctg tac aac tcc tac aag gac ttc cca gtc acc 499 Ala Thr Val Lys Asp Leu Tyr Asn Ser Tyr Lys Asp Phe Pro Val Thr 120 125 ttg tac cag atc cag acc aag tac cgc gat gag gaa cgc cca cgc gca Leu Tyr Gln Ile Gln Thr Lys Tyr Arg Asp Glu Glu Arg Pro Arg Ala 135 ggc gtg ctc cgc gga cgc gaa ttt gtg atg aag gat tct tac tcc ttc Gly Val Leu Arg Gly Arg Glu Phe Val Met Lys Asp Ser Tyr Ser Phe 150 160 gac atc tcg gat gct ggt ttg gac gag tcc tac gca aag cac cgc gca 643 Asp Ile Ser Asp Ala Gly Leu Asp Glu Ser Tyr Ala Lys His Arg Ala gcg tat cag cgc atc ttt gac cgc ctt ggc ttg gaa tac gcc atc tgc 691 Ala Tyr Gln Arg Ile Phe Asp Arg Leu Gly Leu Glu Tyr Ala Ile Cys 185 190 cag gca acc tet ggt gcc atg ggc gga tec get tec gag gaa tte ett 739 Gln Ala Thr Ser Gly Ala Met Gly Gly Ser Ala Ser Glu Glu Phe Leu 200 gca gta tct gaa aac ggc gaa gat acc ttc gtg cgc tct acc tcc ggc 787 Ala Val Ser Glu Asn Gly Glu Asp Thr Phe Val Arg Ser Thr Ser Gly 215 aat tac gcc gca aac gtg gaa gct gtt gtt acc cag cca ggc gtt gag 835 Asn Tyr Ala Ala Asn Val Glu Ala Val Val Thr Gln Pro Gly Val Glu 230 cgt gac atc gaa ggc ctg cca gaa cca gtc acc tac gaa act cct gtt 883 Arg Asp Ile Glu Gly Leu Pro Glu Pro Val Thr Tyr Glu Thr Pro Val 250 255 tct gaa acc atc gat gct ttg gtt gat tgg gct aac tcc atc gac gtg 931 Ser Glu Thr Ile Asp Ala Leu Val Asp Trp Ala Asn Ser Ile Asp Val cag atc gag ggc cgc gag gtc acc gca gat gac acc ctc aag tgc att 979 Gln Ile Glu Gly Arg Glu Val Thr Ala Asp Asp Thr Leu Lys Cys Ile gtg gtg aag gtc cgc gag cca ggt gcc gaa gaa gca gaa ctc act gga 1027 Val Val Lys Val Arg Glu Pro Gly Ala Glu Glu Ala Glu Leu Thr Gly

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355

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360

Val Val Thr Gly Thr Ser Trp Ile Thr Gly Ala Asp Glu Lys Glu Arg 375 His Val Val Gly Leu Val Ala Gly Arg Asp Phe Thr Pro Asp Gly Phe 395 Ile Glu Ala Ala Glu Ile Lys Glu Gly Asp Pro Ala Pro Ala Gly Glu Gly Thr Leu Thr Leu Ala Arg Gly Ile Glu Ile Gly Ile Ser Ser 420 Ser Ala Ala Ser Thr Pro Lys Pro Ser Thr Ser Lys Ser Trp Thr Lys Thr Ala Ser Ala Pro Ser Gln Pro Trp Ala Leu Arg Ala Arg Cys His Pro Pro Ala Arg Arg Pro Gly Arg Thr Ala Pro Arg 470 <210> 327 <211> 1031 <212> DNA <213> Corynebacterium glutamicum <220> <221> CDS <222> (94)..(1008) <223> FRXA01938 <400> 327 ccgcgatgag gaacgcccac gcgcaggcgt gctccgcggg acgcgaattt gtgatgaagg 60 attettacte ettegacate tegggatget ggtttg gae gag tee tae gea aag Leu Asp Glu Ser Tyr Ala Lys cac ege gea geg tat eag ege ate ttt gae ege ett gge ttg gaa tae 162 His Arg Ala Ala Tyr Gln Arg Ile Phe Asp Arg Leu Gly Leu Glu Tyr gee ate tge cag gea ace tet ggt gee atg gge gga tee get tee gag Ala Ile Cys Gln Ala Thr Ser Gly Ala Met Gly Gly Ser Ala Ser Glu gaa ttc ctt gca gta tct gaa aac ggc gaa gat acc ttc gtg cgc tct Glu Phe Leu Ála Val Ser Glu Asn Gly Glu Ásp Thr Phe Val Arg Ser ace tee gge aat tae gee gea aac gtg gaa get gtt gtt ace eag eea 306 Thr Ser Gly Asn Tyr Ala Ala Asn Val Glu Ala Val Val Thr Gln Pro ggc gtt gag cgt gac atc gaa ggc ctg cca gaa cca gtc acc tac gaa Gly Val Glu Arg Asp Ile Glu Gly Leu Pro Glu Pro Val Thr Tyr Glu 80 act cet gtt tet gaa ace ate gat get ttg gtt gat tgg get aac tee Thr Pro Val Ser Glu Thr Ile Asp Ala Leu Val Asp Trp Ala Asn Ser

90 95 100
atc gac gtg cag atc gag ggc cgc gag gtg agc ggc

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120	Cys	116	· val	. val	125	s val	. Arç	J Gli	ı Pro	0 Gly 130	/ Ala	. Glu	ı Glü	ı Ala	gaa Glu 135	498
		CIY	110	140	Leu	PIC	. GTŽ	/ Asp	145	j Glu	ı Val	Asp	Met	Lys 150		546
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<213> Corynebacterium glutamicum

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300

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1389

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<212> PRT

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Arg Ala Glu Gln Lys Ala Phe Gly Lys Lys Ile Gly Gln Ala Ser Pro 50 60

Glu Asp Arg Pro Ala Leu Leu Glu Gly Ser Asn Glu Leu Lys Ala Lys
65 70 75 80

Val Lys Asp Ala Glu Ala Ala Glu Ala Ala Glu Ala Lys Val Asn 85 90 95

Glu Leu Gln Met Lys Leu Ser Asn Val Val Ser Gly Ala Pro Ala Gly 100 105 110

Gly Glu Asp Asp Phe Val Val Leu Glu Thr Ile Gly Glu Pro Arg Thr 115 120 125

Phe Asp Phe Glu Pro Lys Asp His Leu Glu Leu Gly Glu Ser Leu Gly 130 135 140

Leu Ile Asp Met Lys Arg Gly Thr Lys Val Ser Gly Ala Arg Phe Tyr 145 150 155 160

Tyr Leu Thr Gly Asp Gly Ala Met Leu Gl
n Leu Gly Met Leu Met Leu 165 \$170\$ 175

Ala Ala Gln Lys Ala Arg Glu Ala Gly Phe Ser Met Met Ile Pro Pro 180 185 190

Val Leu Val Arg Pro Glu Ile Met Ala Gly Thr Gly Phe Leu Gly Asp 195 200 205

His Ser Glu Glu Ile Tyr Tyr Leu Glu Arg Asp Asp Met Tyr Leu Val 210 215 220

Gly Thr Ser Glu Val Ala Leu Ala Gly Tyr His Lys Asp Glu Ile Ile 225 230 235 240

Asp Leu Asn Glu Gly Pro Val Lys Tyr Ala Gly Trp Ser Ser Cys Phe 245 250 255

Arg Arg Glu Ala Gly Ser Tyr Gly Lys Asp Thr Arg Gly Ile Leu Arg

260 265 270 Val His Gln Phe Asp Lys Val Glu Met Phe Val Tyr Cys Lys Pro Glu 280 285 Asp Ala Glu Asp Val His Gln Gln Leu Leu Gly Met Glu Lys Glu Met 295 Leu Ala Ala Ile Glu Val Pro Tyr Arg Val Ile Asp Val Ala Gly Gly 310 315 Asp Leu Gly Ala Ser Ala Ala Arg Lys Phe Asp Thr Glu Ala Trp Val Pro Thr Gln Asp Thr Tyr Arg Glu Leu Thr Ser Thr Ser Asn Cys Thr 345 Thr Phe Gln Ala Arg Arg Leu Gln Thr Arg Tyr Arg Asp Glu Asn Gly 355 Lys Pro Gln Ile Ala Ala Thr Leu Asn Gly Thr Leu Ala Thr Thr Arg Trp Leu Val Ala Ile Leu Glu Asn Asn Gln Gln Ala Asp Gly Ser Val 385 Val Val Pro Glu Ala Leu Arg Pro Phe Val Gly Lys Asp Val Leu Lys 410 Pro Val Lys Gln Ala Gly 420 <210> 331 <211> 1383 <212> DNA <213> Corynebacterium glutamicum <220> <221> CDS <222> (101)..(1360) <223> RXA02167 <400> 331 ggcctatcgc attgacgacg gaattccggt gcttctcatc gacgaagcca ccgagtggac 60 ccccaacaac tagaagtaca tcaaggacat ttttaacacc atg aac atc att gac 115 Met Asn Ile Ile Asp 1 gaa etc tec tgg ege gga etc atc aac eag tec ace gae ett gag gee Glu Leu Ser Trp Arg Gly Leu Ile Asn Gln Ser Thr Asp Leu Glu Ala 10 20 ctt cgc gag gaa gct tca acc ccc atc acc ttg tac tgc gga ttc gac 211 Leu Arg Glu Glu Ala Ser Thr Pro Ile Thr Leu Tyr Cys Gly Phe Asp 25 30 35 cca acc ggt cca tcc ctc cac gca gga cac ctc gtt cca ctg ctc atg Pro Thr Gly Pro Ser Leu His Ala Gly His Leu Val Pro Leu Leu Met 40 45 50

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							gac Asp									355
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							ttc Phe									451
							aac Asn 125									499
							tcc Ser									547
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							ctc Leu									835
							ttc Phe									883
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gga Gly	cca Pro	cac His	atc Ile 180	cca Pro	acc Thr	acc Thr	cgc Arg	tac Tyr 185	att Ile	cca Pro	gca Ala	ttc Phe	gca Ala 190	ttg Leu	acc Thr	576
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acc Thr	ccg Pro 290	cac His	atc Ile	acc Thr	aag Lys	cag Gln 295	gat Asp	ctc Leu	ttt Phe	gag Glu	cgt Arg 300	tcc Ser	ggt Gly	cac His	ctt Leu	912
ggt Gly 305	ttc Phe	tac Tyr	aag Lys	gat Asp	ggc Gly 310	atg Met	ttc Phe	cct Pro	cca Pro	atg Met 315	cag Gln	gtg Val	gat Asp	gcg Ala	gag Glu 320	960
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650

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1994

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Phe Thr Ala Val Pro Ala Asn Thr Asp Asp Gly Arg Ala Val Ile Arg
35 40 45

His Ser Cys Ala His Val Leu Ala Gln Ala Val Gln Ala Glu Phe Pro 50 60

Gly Thr Lys Leu Gly Ile Gly Pro Ala Ile Glu Asn Gly Phe Tyr Tyr 65 70 75 80

Asp Phe Asp Ala Ala Glu Pro Phe Thr Pro Glu Asp Leu Lys Thr Ile 85 90 95

Glu Lys Arg Met Lys Lys Ile Ile Lys Thr Gly Gln Lys Phe Glu Arg 100 105 110

Arg Val Tyr Glu Ser Ala Glu Ala Ala Ala Glu Glu Leu Lys Asn Glu 115 120 125

Pro Tyr Lys Leu Glu Leu Ile Gln Asp Lys Gly Asn Val Asp Pro Asn 130 135 140

Ser Asp Glu Ala Thr Glu Val Gly Ala Gly Glu Leu Thr Ala Tyr Asp 145 150 155 160

Asn Val Asn Pro Arg Thr Ser Glu Val Glu Trp Ser Asp Leu Cys Arg 165 170 175

Gly Pro His Ile Pro Thr Thr Arg Tyr Ile Pro Ala Phe Ala Leu Thr 180 185 190

Arg Ser Ser Ala Ala Tyr Trp Arg Gly Asp Gln Asp Asn Ala Gly Leu 195 200 205

Gln Arg Ile Tyr Gly Thr Ala Trp Glu Asp Lys Glu Ser Leu Asp Ala 210 215 220

Tyr Gln Thr Met Leu Ala Glu Ala Glu Lys Arg Asp His Arg Arg Leu 225 230 235 240

Gly Thr Glu Leu Asp Leu Phe Ser Phe Pro Asp Asp Leu Gly Ser Gly 245 250 255

Leu Pro Val Phe His Pro Asn Gly Gly Ile Val Arg Asn Glu Met Glu 260 265 270

Asp His Ser Arg Arg Arg His Ile Ala Ala Gly Tyr Ser Phe Val Asn 275 280 285

Thr Pro His Ile Thr Lys Gln Asp Leu Phe Glu Arg Ser Gly His Leu 290 295 300

Gly Phe Tyr Lys Asp Gly Met Phe Pro Pro Met Gln Val Asp Ala Glu 310 315 Phe Asp Glu Asp Gly Asn Val Thr Lys Pro Gly Gln Glu Tyr Tyr Leu Lys Pro Met Asn Cys Pro Met His Asn Leu Ile Phe Asp Ser Arg Gly Arg Ser Tyr Arg Glu Leu Pro Leu Arg Leu Phe Glu Phe Gly Asn Val Tyr Arg Tyr Glu Lys Ser Gly Val Ile His Gly Leu Thr Arg Ala Arg Gly Phe Thr Gln Asp Asp Ala His Ile Tyr Cys Thr Glu Asp Gln Leu Glu Ala Glu Leu Thr Ser Val Leu Asp Phe Ile Leu Ser Leu Leu Arg 405 410 Asp Tyr Gly Leu Asp Asp Phe Tyr Leu Glu Leu Ser Thr Arg Asp Pro Lys Lys Ser Val Gly Ser Asp Glu Ile Trp Glu Arg Ser Thr Glu Ile 440 Leu Asn Arg Val Ala Thr Asn Ser Gly Leu Glu Leu Val Pro Asp Pro 455 Glu Gly Ala Ala Phe Tyr Gly Pro Lys Ile Ser Val Gln Ala Arg Asp 475 Ala Ile Gly Arg Thr Trp Gln Met Ser Thr Val Gln Leu Asp Phe Asn 485 Met Pro Glu Arg Phe Asn Leu Glu Tyr Thr Ser Ser Asp Gly Ser Lys 505 Gln Gln Pro Ile Met Ile His Arg Ala Leu Phe Gly Ser Ile Glu Arg Phe Phe Gly Val Leu Leu Glu His Tyr Ala Gly Ala Phe Pro Ala Trp 535 Leu Ala Pro His Gln Val Met Gly Ile Pro Val Ala Asp Asp Cys Ile 555 Pro His Leu Glu Thr Ile Thr Ala Gln Leu Arg Glu Lys Gly Ile Arg 570 Ala Asp Val Asp Thr Ser Asp Asp Arg Met Gln Lys Lys Ile Arg Asn His Thr Thr Gly Lys Val Pro Phe Met Leu Leu Ala Gly Ala Arg Asp 600 Val Glu Ala Asn Ala Val Ser Phe Arg Phe Leu Asp Gly Thr Gln Val Asn Gly Val Pro Val Asp Glu Ala Ile Ala Val Ile Ser Ser Trp Ile

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Glu Asn Lys Pro Gly Val Ser Asn Leu Leu Val Ile Gln Ser Ala Leu
50 55 60

acg ggt acc tcc atc gat tcg ctt gtc gac ggc tac cag ggc gct ggc 240
Thr Gly Thr Ser Ile Asp Ser Leu Val Asp Gly Tyr Gln Gly Ala Gly
65 70 75 80

tac ggt gcg ttg aag ggt gac acc gcc gac gcg ctt gag gct ttc acc
Tyr Gly Ala Leu Lys Gly Asp Thr Ala Asp Ala Leu Glu Ala Phe Thr
85 90 95

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Thr Pro Leu Lys Ala Lys Tyr Asp Glu Tyr Met Asn Asp Arg Gly Glu
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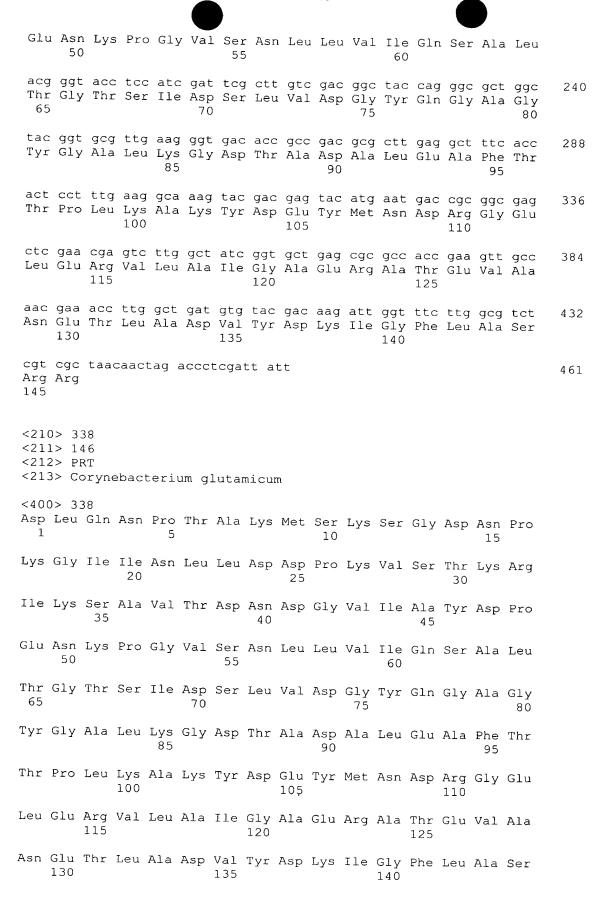
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Arg Arg
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192



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aaa Lys	gat Asp	cto Leu	acc Thr	gca Ala 10	. Gin	acc Thr	gct Ala	tcc Ser	aga Arg 15	gtc Val	ctt Leu	tct Ser	gga Gly	att Ile 20	cag Gln	163
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GIII	пр	40	ASP	Leu	GIn	Asp	Ser 45	Tyr	Asp	gcc Ala	Phe	Tyr 50	Phe	Ile	Pro	259
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Leu Gly Ala Val Lys Gln Trp Ile Asp Leu Gln Asp Ser Tyr Asp Ala

Phe Tyr Phe Ile Pro Asp Leu His Ala Ile Thr Val Asp Gln Glu Pro

Glu Glu Leu Arg Asn Arg Thr Ile Ser Gly Ala Ala Gln Leu Leu Ala 70

Leu Gly Ile Asp Pro Glu Arg Ser Thr Leu Phe Val Gln Ser His Val 85

Pro Ala His Ala Glu Leu Ser Trp Val Leu Thr Cys Leu Thr Gly Phe 100

Gly Glu Ala Ser Arg Met Thr Gln Phe Lys Asp Lys Ser Ser Lys Arg 120

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gat Asp	cto Leu 55	птѕ	geg Ala	att Ile	acc Thr	gtc Val 60	gat Asp	cag Gln	gaa Glu	cca Pro	gaa Glu 65	Glu	ctg Leu	cgc Arg	aac Asn	307
cgc Arg 70	acc Thr	att Ile	tcc Ser	ggc Gly	gcc Ala 75	gca Ala	cag Gln	ctg Leu	ctg Leu	gcc Ala 80	Leu	ggc	att Ile	gat Asp	cca Pro 85	355
gaa Glu	cgc Arg	tcc Ser	acc Thr	ttg Leu 90	ttt Phe	gtg Val	cag Gln	tcg Ser	cat His 95	gtt Val	ccc Pro	gca Ala	cat His	gca Ala 100	gaa Glu	403
ctg Leu	tca Ser	tgg Trp	gtt Val 105	ctg Leu	acc Thr	tgc Cys	ctg Leu	acc Thr 110	ggt Gly	ttc Phe	ggc Gly	gag Glu	gca Ala 115	tcc Ser	cgc Arg	451
atg Met	acc Thr	cag Gln 120	ttc Phe	aag Lys	gac Asp	aag Lys	tcc Ser 125	tcc Ser	aag Lys	cgt Arg	ggc Gly	gcc Ala 130	gac Asp	cgt Arg	acc Thr	499
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Phe	Tyr 50	Phe	Ile	Pro	Asp	Leu 1 55	His .	Ala	Ile	Thr	Val 60	Asp	Gln	Glu	Pro	
Glu 65	Glu	Leu	Arg	Asn .	Arg '	Thr :	Ile :	Ser	Gly	Ala 75	Ala	Gln	Leu	Leu	Ala 80	
Leu	Gly	Ile .	Asp	Pro 85	Glu <i>i</i>	Arg S	Ser :	Thr	Leu 90	Phe	Val	Gln	Ser	His 95	Val	

Pro Ala His Ala Glu Leu Ser Trp Val Leu Thr Cys Leu Thr Gly Phe 100 105 110

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- aag tcc tgg gat cct aaa gct gta gaa gct gat ttg tac cag ggc tgg 211 Lys Ser Trp Asp Pro Lys Ala Val Glu Ala Asp Leu Tyr Gln Gly Trp 25 30 35
- gta gac gcc ggt tat ttc act gcc gat cct gct agc gac aag cca gga 259
 Val Asp Ala Gly Tyr Phe Thr Ala Asp Pro Ala Ser Asp Lys Pro Gly
 40 45 50
- ttc tcc att gtt ctg cct cca cca aac gtg acc ggc cag ctg cac atg
 Phe Ser Ile Val Leu Pro Pro Pro Asn Val Thr Gly Gln Leu His Met
 55 65
- gga cac gca ctt gac cac acc ctg atg gat gct ctt gca cgt cgc aag 355 Gly His Ala Leu Asp His Thr Leu Met Asp Ala Leu Ala Arg Arg Lys 70 75 80 85
- cgc atg cag ggc ttt gag gtt ttg tgg ctg cca ggt atg gac cac gcg 403 Arg Met Gln Gly Phe Glu Val Leu Trp Leu Pro Gly Met Asp His Ala 90 95 100
- ggt atc gcg acc cag acc aag gtc gag gag atg ctg aag gaa act gaa 451 Gly Ile Ala Thr Gln Thr Lys Val Glu Glu Met Leu Lys Glu Thr Glu 105 110 115

Gl)	c aa y Ly:	a ac s Th 12		c ta g Ty	c ga r As	c ta p Ty	t ga r As 12	p Ar	c ga g Gl	a ga u Gl	g tt u Ph	c at e Il 13	e Al	c aa a Ly	g gtc s Val	499
tg <u>q</u> Trp	g gag Glu 135		g aa p Ly	g caa s Gli	a ga n Gl	a ta u Ty 140	C GT	t gg y Gl	a aa y Ly	g at s Il	c gg e Gl 14	y Gl	g ca u Gl	g ato n Me	g cgc t Arg	547
gec Ala 150		gg Gl	c ga y As	t tco p Sei	yai Vai	L ASL	tgç Tr	g to Se:	c cg	c ga g Gl 16	u Ar	t tto g Phe	c ace	c tto r Lei	g gat 1 Asp 165	595
gac Asp	G17 ggc	tto Lei	g to u Se:	c cgc r Arg 170	HIC	gto Yal	caa Glr	a acq	g att 116 175	e Phe	c aad e Lys	g aaq s Lys	g cti Lei	t tto 1 Phe 180	gac Asp	643
gcc Ala	ggc	cto Lei	2 ato 11 Ile 185	= TAT	cag Glr	g gcc Ala	aac Asn	cgo Arg 190	j Lei	gto Val	c aad L Asr	tgg Trp	tco Ser 195	Pro	gta Val	691
cta Leu	gaa Glu	acc Thr 200		g gtt Val	tct Ser	gac Asp	atc Ile 205	GIU	ı gtt ı Val	ato . Ile	tac Tyr	aag Lys 210	gat Asp	gtc Val	gaa Glu	739
Gly	gaa Glu 215	ctg Leu	gta Val	tcc Ser	att Ile	cgc Arg 220	tat Tyr	ggt Gly	tcc Ser	ctc Leu	aac Asn 225	Asp	gat Asp	gaa Glu	cca Pro	787
cat His 230	gtc Val	att Ile	gtt Val	gcc Ala	acc Thr 235	acc Thr	cgt Arg	gtg Val	gaa Glu	acc Thr 240	Met	ctc Leu	ggc Gly	gac Asp	gtc Val 245	835
gct Ala	gtt Val	gcc Ala	gtg Val	cac His 250	cca Pro	gac Asp	gat Asp	gag Glu	cgc Arg 255	tac Tyr	aag Lys	gat Asp	ttg Leu	gtc Val 260	gga Gly	883
cag Gln	acc Thr	ctg Leu	cct Pro 265	cac His	cca Pro	ttc Phe	cgc Arg	gat Asp 270	gac Asp	ctg Leu	agc Ser	ctg Leu	aag Lys 275	gtt Val	gtt Val	931
gct Ala	gat Asp	gat Asp 280	tac Tyr	gtc Val	gac Asp	cca Pro	gag Glu 285	ttc Phe	ggc Gly	tcc Ser	ggt Gly	gcc Ala 290	gtc Val	aag Lys	atc Ile	979
	cca Pro 295	gca Ala	cac His	gac Asp	cct Pro	aat Asn 300	gac Asp	tac Tyr	gct Ala	ctt Leu	ggc Gly 305	ctg Leu	cgc Arg	cac His	aac Asn	1027
ctg Leu 2 310	gac Asp	atg Met	cct Pro	acc Thr	atc Ile 315	atg Met	gac Asp	aag Lys	acc Thr	gga Gly 320	cgc Arg	att Ile	gcc Ala	gat Asp	acc Thr 325	1075
gga a Gly :	acc Thr	cag Gln	ttt Phe	gat Asp 330	ggc Gly	ctg Leu	acc Thr	cgc Arg	gaa Glu 335	gaa Glu	gca Ala	cgc Arg	atc Ile	aag Lys 340	gtc Val	1123
cgc (Arg (gaa (Glu (gaa Glu	ctc Leu 345	gca Ala	gcc Ala	cag Gln	сту.	cgc Arg 350	att Ile	gtc Val	aag Lys	Glu	att Ile 355	cgc Arg	cca Pro	1171

tac Tyr	gto Val	c ca l Hi 36	3 26	c gt r Va	c gga	a cad	c tco s Sei 36!	r Git	g cg ı Ar	t tc g Se	c gg r Gl	c ga y Gl	u Al	t at a Il	t gag e Glu	1219
cct Pro	cgt Arc 375	9 110	g to u Se:	t cto	g caq ı Glr	g tgg n Trp 380	Phe	c gto e Val	aa Ly:	g gto s Va	c ga l Gl: 38!	u Gl	g cto	g gc	c aag a Lys	1267
atg Met 390	261	Gl	c gat / Asp	c gco Ala	e gto a Val 395	. Arç	gaa g Glu	a ggc a Gly	gao Asp	c according This	Thi	c ato	c cac e His	c cco	g aag Lys 405	1315
561	neu	. GIL	1 PIC	410	y Tyr	Phe	Asp	Trp	Val 415	. Asp	Asr	n Met	. His	420		1363
****	110	Jer	425	GII	ı Leu	. irp	Trp	430	His	: Arg	Ile	Pro	11e 435	Trp	tat Tyr	1411
GIY	FIO	440	ASP	Glu	TTe	lle	Cys 445	Val	Gly	Pro	Asp	Glu 450	Gln	Ala	cct Pro	1459
Glu	455	ıyı	val	GIN	Asp	Pro 460	Asp	Val	Leu	Asp	Thr 465	Trp	Phe	Ser		1507
470	Leu	тър	FLO	rne	tct Ser 475	rnr	мет	Gly	Trp	Pro 480	Glu	Lys	Thr	Pro	Glu 485	1555
Бeu	Giu	гуз	rne	1yr 490	cca Pro	Thr	Ser	Val	Leu 495	Val	Thr	Ala	Tyr	Asp 500	Ile	1603
пец	rne	rne	505	vai		Arg	Met	Met 510	Met	Phe	Gly	Thr	Phe 515	Ala	Ala	1651
aag Lys	GIU	520	PIO	GIU	Leu	Leu	525	Glu	Gly	Lys	Asp	Gly 530	Arg	Pro	Gln	1699
	535	rne	1111	ASP	Leu	540	Leu	His	Gly	Leu	Val 545	Arg	Asp	Glu	His	1747
ggc 6 Gly 2 550	arg	тÀ2	Mec	ser	Lys 555	Ser	Leu	Gly	Asn	Gly 560	Ile	Asp	Pro	Met	Asp 565	1795
tgg (Val (GIU	ASN	Tyr 570	GTÀ	Ala	Asp	Ala	Leu 575	Arg	Phe	Thr	Leu	Ala 580	Arg	1843
ggc o	ira A	H511	585	СТĀ	val .	Asp	Leu	Pro ' 590	Val	Gly	Glu	Asp	Ser 595	Ala	Gln	1891
agc t	CC (egt .	aac	ttt	gcc .	acc .	aag	ctg ·	ttc	aac	gca	acc	aag	ttt	gcg	1939

Ser	Sei	Arc 600	g Ası O	n Phe	e Ala	a Thi	Lys 605	s Leu	ı Phe	e Asr	n Ala	Thr		s Phe	e Ala	
ctg Leu	ato Met 615	ASI	c ggt n Gly	z gca 7 Ala	a gto a Val	tco Ser 620	Glu	a ggc ı Gly	cto Lei	g cca ı Pro	gca Ala 625	Arg	gaa Glu	ı gaa ı Glu	a ctc ı Leu	1987
acc Thr 630	ASE	gct Ala	gac Asp	c cgo Aro	tgg Trp 635	Ile	gtg Val	gac Asp	cto	ctt Leu 640	Glu	r cag Gln	gtt Val	cgc Arç	ctc Leu 645	2035
gac Asp	gtt Val	gat Asp	gct Ala	tac Tyr 650	Leu	gac Asp	aac Asn	tac Tyr	cag Gln 655	Phe	gcg Ala	aag Lys	gcc Ala	aac Asn 660	gag Glu	2083
gag Glu	ctc Leu	tac Tyr	cac His 665	Phe	gcg Ala	tgg Trp	aac Asn	gag Glu 670	ttc Phe	tgt Cys	gac Asp	tgg Trp	tac Tyr 675	ctg Leu	gaa Glu	2131
atc Ile	gcg Ala	aag Lys 680	gtt Val	cag G i n	atc Ile	cca Pro	cgc Arg 685	gaa Glu	ggc Gly	acc Thr	tcc Ser	gct Ala 690	cag Gln	ggt Gly	gaa Glu	2179
aac Asn	acc Thr 695	caa Gln	aag Lys	gtg Val	ctt Leu	ggc Gly 700	cat His	gtc Val	ttg Leu	gat Asp	gca Ala 705	ctg Leu	ctt Leu	cgt Arg	ctg Leu	2227
ctg Leu 710	cac His	cca Pro	gct Ala	atg Met	cct Pro 715	ttc Phe	gtc Val	acc Thr	gaa Glu	gtt Val 720	ctg Leu	tgg Trp	cag Gln	gca Ala	ctt Leu 725	2275
act Thr	gat Asp	cgc Arg	acc Thr	tcc Ser 730	atc Ile	gtg Val	gtg Val	gcc Ala	tcc Ser 735	tgg Trp	cca Pro	acc Thr	gca Ala	gct Ala 740	gac Asp	2323
acc Thr	aac Asn	ggc Gly	gga Gly 745	gtc Val	gcc Ala	gtg Val	gac Asp	gct Ala 750	gat Asp	gca Ala	gct Ala	agg Arg	cgc Arg 755	att Ile	ggc Gly	2371
gac Asp	gtc Val	gag Glu 760	aag Lys	ctt Leu	gtt Val	act Thr	gag Glu 765	gtt Val	cgt Arg	cgt Arg	ttc Phe	cgc Arg 770	gct Ala	gac Asp	cag Gln	2419
ggt Gly	gtg Val 775	aag Lys	cct Pro	tcc Ser	cag Gln	aag Lys 780	gtt Val	cca Pro	gca Ala	cgc Arg	ctt Leu 785	gat Asp	ttc Phe	gtg Val	gca Ala	2467
tgt Cys 790	gac Asp	ctg Leu	cag Gln	gat Asp	ctg Leu 795	gaa Glu	gat Asp	tcc Ser	gtg Val	cgc Arg 800	tcc Ser	ctg Leu	gtt Val	cgc Arg	atc Ile 805	2515
gag (Glu (caa Gln	cca Pro	gaa Glu	gat Asp 810	gat Asp	ttc Phe	gca Ala	gct Ala	tct Ser 815	gcc Ala	agc Ser	ctg Leu	Glu	atc Ile 820	cgc Arg	2563
ctg a Leu S	agc Ser	caa Gln	gca Ala 825	acc Thr	atc Ile	acg Thr	Val	gag Glu 830	ctt Leu	gac Asp	acc Thr	Ser	gga Gly 835	act Thr	gtt Val	2611
gac q Asp V	gtt /al	gca Ala	gca Ala	gag Glu	cgc Arg	aag Lys	cgc Arg	ctg Leu	gaa Glu	aag Lys	gac Asp	ctg Leu	gct Ala	aac Asn	gca Ala	2659

840

845 850 cag aag gaa ttg gaa acc acc gca aag aag ctg ggt aat gag gct ttc 2707 Gln Lys Glu Leu Glu Thr Thr Ala Lys Lys Leu Gly Asn Glu Ala Phe 865 ctg tcc aag gca cct gat gca gtg gta gac aag atc cgt ggc cgt gcg 2755 Leu Ser Lys Ala Pro Asp Ala Val Val Asp Lys Ile Arg Gly Arg Ala 880 cag att gcc caa gaa gaa gtt gag cgc att aac aag cgt ctg gag gaa 2803 Gln Ile Ala Gln Glu Glu Val Glu Arg Ile Asn Lys Arg Leu Glu Glu 895 ttg gcc tagtggctaa caacgacgga atc 2832 Leu Ala

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<213> Corynebacterium glutamicum

<400> 344

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Leu Tyr Gln Gly Trp Val Asp Ala Gly Tyr Phe Thr Ala Asp Pro Ala 40

Ser Asp Lys Pro Gly Phe Ser Ile Val Leu Pro Pro Pro Asn Val Thr 55

Gly Gln Leu His Met Gly His Ala Leu Asp His Thr Leu Met Asp Ala 7.5

Leu Ala Arg Arg Lys Arg Met Gln Gly Phe Glu Val Leu Trp Leu Pro 90

Gly Met Asp His Ala Gly Ile Ala Thr Gln Thr Lys Val Glu Glu Met 105

Leu Lys Glu Thr Glu Gly Lys Thr Arg Tyr Asp Tyr Asp Arg Glu Glu 120

Phe Ile Ala Lys Val Trp Glu Trp Lys Gln Glu Tyr Gly Gly Lys Ile 135

Gly Glu Gln Met Arg Ala Ile Gly Asp Ser Val Asp Trp Ser Arg Glu 150 155

Arg Phe Thr Leu Asp Asp Gly Leu Ser Arg Ala Val Gln Thr Ile Phe 165

Lys Lys Leu Phe Asp Ala Gly Leu Ile Tyr Gln Ala Asn Arg Leu Val 180 185

Asn Trp Ser Pro Val Leu Glu Thr Ala Val Ser Asp Ile Glu Val Ile 195 200 205 Tyr Lys Asp Val Glu Gly Glu Leu Val Ser Ile Arg Tyr Gly Ser Leu 215 Asn Asp Asp Glu Pro His Val Ile Val Ala Thr Thr Arg Val Glu Thr 225 230 Met Leu Gly Asp Val Ala Val Ala Val His Pro Asp Asp Glu Arg Tyr 245 250 Lys Asp Leu Val Gly Gln Thr Leu Pro His Pro Phe Arg Asp Asp Leu Ser Leu Lys Val Val Ala Asp Asp Tyr Val Asp Pro Glu Phe Gly Ser Gly Ala Val Lys Ile Thr Pro Ala His Asp Pro Asn Asp Tyr Ala Leu 290 295 Gly Leu Arg His Asn Leu Asp Met Pro Thr Ile Met Asp Lys Thr Gly 310 315 Arg Ile Ala Asp Thr Gly Thr Gln Phe Asp Gly Leu Thr Arg Glu Glu Ala Arg Ile Lys Val Arg Glu Glu Leu Ala Ala Gln Gly Arg Ile Val 345 Lys Glu Ile Arg Pro Tyr Val His Ser Val Gly His Ser Glu Arg Ser Gly Glu Ala Ile Glu Pro Arg Leu Ser Leu Gln Trp Phe Val Lys Val Glu Glu Leu Ala Lys Met Ser Gly Asp Ala Val Arg Glu Gly Asp Thr Thr Ile His Pro Lys Ser Leu Glu Pro Arg Tyr Phe Asp Trp Val Asp 410 Asn Met His Asp Trp Thr Ile Ser Arg Gln Leu Trp Trp Gly His Arg 425 Ile Pro Ile Trp Tyr Gly Pro Asn Asp Glu Ile Ile Cys Val Gly Pro Asp Glu Gln Ala Pro Glu Gly Tyr Val Gln Asp Pro Asp Val Leu Asp 455 Thr Trp Phe Ser Ser Ala Leu Trp Pro Phe Ser Thr Met Gly Trp Pro Glu Lys Thr Pro Glu Leu Glu Lys Phe Tyr Pro Thr Ser Val Leu Val 490 Thr Ala Tyr Asp Ile Leu Phe Phe Trp Val Ala Arg Met Met Phe

Gly Thr Phe Ala Ala Lys Glu Thr Pro Glu Leu Leu Gly Glu Gly Lys

515 520 525

Asp Gly Arg Pro Gln Val Pro Phe Thr Asp Leu Phe Leu His Gly Leu 530 540

Val Arg Asp Glu His Gly Arg Lys Met Ser Lys Ser Leu Gly Asn Gly 545 550 555 560

Ile Asp Pro Met Asp Trp Val Glu Asn Tyr Gly Ala Asp Ala Leu Arg 565 570 575

Phe Thr Leu Ala Arg Gly Ala Asn Pro Gly Val Asp Leu Pro Val Gly 580 585 590

Glu Asp Ser Ala Gln Ser Ser Arg Asn Phe Ala Thr Lys Leu Phe Asn 595 600 605

Ala Thr Lys Phe Ala Leu Met Asn Gly Ala Val Ser Glu Gly Leu Pro 610 620

Ala Arg Glu Glu Leu Thr Asp Ala Asp Arg Trp Ile Val Asp Leu Leu 625 630 635 640

Glu Gln Val Arg Leu Asp Val Asp Ala Tyr Leu Asp Asn Tyr Gln Phe 645 650 655

Ala Lys Ala Asn Glu Glu Leu Tyr His Phe Ala Trp Asn Glu Phe Cys 660 665 670

Asp Trp Tyr Leu Glu Ile Ala Lys Val Gln Ile Pro Arg Glu Gly Thr 675 680 685

Ser Ala Gln Gly Glu Asn Thr Gln Lys Val Leu Gly His Val Leu Asp 690 695 700

Ala Leu Leu Arg Leu Leu His Pro Ala Met Pro Phe Val Thr Glu Val 705 710 715 720

Leu Trp Gln Ala Leu Thr Asp Arg Thr Ser Ile Val Val Ala Ser Trp 725 730 735

Pro Thr Ala Ala Asp Thr Asn Gly Gly Val Ala Val Asp Ala Asp Ala 740 745 750

Ala Arg Arg Ile Gly Asp Val Glu Lys Leu Val Thr Glu Val Arg Arg 755 760 765

Phe Arg Ala Asp Gln Gly Val Lys Pro Ser Gln Lys Val Pro Ala Arg 770 780

Leu Asp Phe Val Ala Cys Asp Leu Gln Asp Leu Glu Asp Ser Val Arg 785 790 795 800

Ser Leu Val Arg Ile Glu Gln Pro Glu Asp Asp Phe Ala Ala Ser Ala 805 810 815

Ser Leu Glu Ile Arg Leu Ser Gln Ala Thr Ile Thr Val Glu Leu Asp 820 825 830

Thr Ser Gly Thr Val Asp Val Ala Ala Glu Arg Lys Arg Leu Glu Lys 835 840 845

Asp Leu Ala Asn Ala Gln Lys Glu Leu Glu Thr Thr Ala Lys Lys Leu 850 855 860

Gly Asn Glu Ala Phe Leu Ser Lys Ala Pro Asp Ala Val Val Asp Lys 865 870 875 880

Ile Arg Gly Arg Ala Gln Ile Ala Gln Glu Glu Val Glu Arg Ile Asn 885 890 895

Lys Arg Leu Glu Glu Leu Ala 900

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<213> Corynebacterium glutamicum

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<223> FRXA00985

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aaggcacctc cgctcagggt gaaaacaccc aaaaggtg ctt ggc cat gtc ttg gat 116 $$\operatorname{Val}$$ Leu Gly His Val Leu Asp 1 $$\operatorname{5}$$

gca ctg ctt cgt ctg ctg cac cca gct atg cct ttc gtc acc gaa gtt Ala Leu Leu Arg Leu Leu His Pro Ala Met Pro Phe Val Thr Glu Val

ctg tgg cag gca ctt act gat cgc acc tcc atc gtg gtg gcc tcc tgg 212 Leu Trp Gln Ala Leu Thr Asp Arg Thr Ser Ile Val Val Ala Ser Trp 25 30 35

cca acc gca gct gac acc aac ggc gga gtc gcc gtg gac gct gat gca 260 Pro Thr Ala Ala Asp Thr Asn Gly Gly Val Ala Val Asp Ala Asp Ala 40 45 50 55

gct agg cgc att ggc gac gtc gag aag ctt gtt act gag gtt cgt cgt 308 Ala Arg Arg Ile Gly Asp Val Glu Lys Leu Val Thr Glu Val Arg Arg 60 65 70

ttc cgc gct gac cag ggt gtg aag cct tcc cag aag gtt cca gca cgc 356
Phe Arg Ala Asp Gln Gly Val Lys Pro Ser Gln Lys Val Pro Ala Arg
75 80 85

ctt gat ttc gtg gca tgt gac ctg cag gat ctg gaa gat tcc gtg cgc 404 Leu Asp Phe Val Ala Cys Asp Leu Gln Asp Leu Glu Asp Ser Val Arg 90 95 100

tcc ctg gtt cgc atc gag caa cca gaa gat gat ttc gca gct tct gcc Ser Leu Val Arg Ile Glu Gln Pro Glu Asp Asp Phe Ala Ala Ser Ala 105

age etg gag ate ege etg age eaa gea ace ate aeg gtg gag ett gae 500 Ser Leu Glu Ile Arg Leu Ser Gln Ala Thr Ile Thr Val Glu Leu Asp

120

135

125 130

acc tct gga act gtt gac gtt gca gca gag cgc aag cgc ctg gaa aag 548
Thr Ser Gly Thr Val Asp Val Ala Ala Glu Arg Lys Arg Leu Glu Lys
140 145 150

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160
165

<210> 346

<211> 165

<212> PRT

<213> Corynebacterium glutamicum

<400> 346

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Met Pro Phe Val Thr Glu Val Leu Trp Gln Ala Leu Thr Asp Arg Thr 20 25 30

Ser Ile Val Val Ala Ser Trp Pro Thr Ala Ala Asp Thr Asn Gly Gly $35 \hspace{1cm} 40 \hspace{1cm} 45$

Val Ala Val Asp Ala Asp Ala Ala Arg Arg Ile Gly Asp Val Glu Lys 50 60

Leu Val Thr Glu Val Arg Arg Phe Arg Ala Asp Gln Gly Val Lys Pro 65 70 75 80

Ser Gln Lys Val Pro Ala Arg Leu Asp Phe Val Ala Cys Asp Leu Gln
85 90 95

Asp Leu Glu Asp Ser Val Arg Ser Leu Val Arg Ile Glu Gln Pro Glu 100 105 110

Asp Asp Phe Ala Ala Ser Ala Ser Leu Glu Ile Arg Leu Ser Gln Ala 115 120 125

Thr Ile Thr Val Glu Leu Asp Thr Ser Gly Thr Val Asp Val Ala Ala 130 135 140

Glu Thr Thr Ala Lys
165

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<212> DNA

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<220>

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<222> (101)..(2149)

<223> FRXA01347

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ga Ası	c ca p Gli	g aa n As:	t aa n Asi	t gaq n Glu 10	ומד ג	e aco	c ago r Sei	c caç Glr	g aad Asr 15	ı Arç	g gca g Ala	a gad a Asp	c aaq Lys	g cto Let 20	g ccc 1 Pro	163
aaq Lys	g tco s Sei	c tgo r Trl	g gat p Asp 25	o Pro	aaa Lys	a gct s Ala	gta Val	a gaa . Glu 30	ı Ala	gat Asp	tto Lei	g tac ı Tyr	caç Gln 35	Gl	tgg 7 Trp	211
gta Val	a gad L Asp	c gcd Ala 40	r GTZ	tat / Tyr	ttc Phe	act Thr	gcc Ala 45	Asp	cct Pro	gct Ala	ago Ser	gac Asp 50	Lys	cca Pro	gga Gly	259
tto Phe	tcc Ser 55	. TTE	gtt Val	ctg Leu	cct Pro	cca Pro 60	Pro	aac Asn	gtg Val	acc Thr	ggc Gly 65	Gln	ctg Leu	cac	atg Met	307
gga Gly 70	птэ	gca Ala	ctt Leu	gac Asp	cac His 75	acc Thr	ctg Leu	atg Met	gat Asp	gct Ala 80	ctt Leu	gca Ala	cgt Arg	cgc Arg	aag Lys 85	355
cgc Arg	atg Met	cag Gln	ggc Gly	ttt Phe 90	gag Glu	gtt Val	ttg Leu	tgg Trp	ctg Leu 95	cca Pro	ggt Gly	atg Met	gac Asp	cac His 100	gcg Ala	403
ggt Gly	atc Ile	gcg Ala	acc Thr 105	cag Gln	acc Thr	aag Lys	gtc Val	gag Glu 110	gag Glu	atg Met	ctg Leu	aag Lys	gaa Glu 115	act Thr	gaa Glu	451
ggc Gly	aaa Lys	act Thr 120	cgc Arg	tac Tyr	gac Asp	tat Tyr	gac Asp 125	cgc Arg	gaa Glu	gag Glu	ttc Phe	atc Ile 130	gcc Ala	aag Lys	gtc Val	499
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gcc Ala 150	atc Ile	ggc Gly	gat Asp	tcc Ser	gtg Val 155	gac Asp	tgg Trp	tcc Ser	cgc Arg	gag Glu 160	cgt Arg	ttc Phe	acc Thr	ttg Leu	gat Asp 165	595
gac Asp	ggc Gly	ttg Leu	tcc Ser	cgc Arg 170	gcc Ala	gtc Val	caa Gln	acg Thr	att Ile 175	ttc Phe	aag Lys	aag Lys	ctt Leu	ttc Phe 180	gac Asp	643
gcc Ala	Gly	ctc Leu	atc Ile 185	tat Tyr	cag Gln	gcc Ala	aac Asn	cgc Arg 190	ctc Leu	gtc Val	aac Asn	tgg Trp	tcg Ser 195	ccc Pro	gta Val	691
cta Leu	GIU	acc Thr 200	gcg Ala	gtt Val	tct Ser	Asp	atc Ile 205	gaa Glu	gtt Val	atc Ile	tac Tyr	aag Lys 210	gat Asp	gtc Val	gaa Glu	739
ggc Gly	gaa Glu	ctg Leu	gta Val	tcc Ser	att Ile	cgc Arg	tat Tyr	ggt Gly	tcc Ser	ctc Leu	aac Asn	gac Asp	gat Asp	gaa Glu	cca Pro	787

215 220 225 cat gtc att gtt gcc acc cgt gtg gaa acc atg ctc ggc gac gtc 835 His Val Ile Val Ala Thr Thr Arg Val Glu Thr Met Leu Gly Asp Val gct gtt gcc gtg cac cca gac gat gag cgc tac aag gat ttg gtc gga 883 Ala Val Ala Val His Pro Asp Asp Glu Arg Tyr Lys Asp Leu Val Gly 255 cag acc ctg cct cac cca ttc cgc gat gac ctg agc ctg aag gtt gtt 931 Gln Thr Leu Pro His Pro Phe Arg Asp Asp Leu Ser Leu Lys Val Val 265 270 get gat gat tac gtc gac cca gag ttc ggc tcc ggt gcc gtc aag atc 979 Ala Asp Asp Tyr Val Asp Pro Glu Phe Gly Ser Gly Ala Val Lys Ile 280 acc cca gca cac gac cct aat gac tac gct ctt ggc ctg cgc cac aac 1027 Thr Pro Ala His Asp Pro Asn Asp Tyr Ala Leu Gly Leu Arg His Asn 300 ctg gac atg cct acc atc atg gac aag acc gga cgc att gcc gat acc 1075 Leu Asp Met Pro Thr Ile Met Asp Lys Thr Gly Arg Ile Ala Asp Thr 310 320 gga acc cag ttt gat ggc ctg acc cgc gaa gaa gca cgc atc aag gtc 1123 Gly Thr Gln Phe Asp Gly Leu Thr Arg Glu Glu Ala Arg Ile Lys Val 330 335 cgc gaa gaa ctc gca gcc cag ggt cgc att gtc aag gaa att cgc cca 1171 Arg Glu Glu Leu Ala Ala Gln Gly Arg Ile Val Lys Glu Ile Arg Pro 345 350 tac gtc cac tcc gtc gga cac tcc gag cgt tcc ggc gaa gct att gag 1219 Tyr Val His Ser Val Gly His Ser Glu Arg Ser Gly Glu Ala Ile Glu 360 370 cct cgt ctg tct ctg cag tgg ttc gtc aag gtc gaa gag ctg gcc aag 1267 Pro Arg Leu Ser Leu Gln Trp Phe Val Lys Val Glu Glu Leu Ala Lys 375 380 atg tcc ggc gat gcc gtg cgc gaa ggc gac acc acc atc cac ccg aag 1315 Met Ser Gly Asp Ala Val Arg Glu Gly Asp Thr Thr Ile His Pro Lys 390 395 400 tcc ctg gag cct cgc tac ttt gac tgg gtt gac aac atg cat gac tgg 1363 Ser Leu Glu Pro Arg Tyr Phe Asp Trp Val Asp Asn Met His Asp Trp 410 415 acc att tcc cgt cag ctg tgg tgg gga cac cgc atc cca att tgg tat 1411 Thr Ile Ser Arg Gln Leu Trp Trp Gly His Arg Ile Pro Ile Trp Tyr 425 gga cca aac gat gaa atc atc tgc gtt ggg cct gat gag cag gca cct 1459 Gly Pro Asn Asp Glu Ile Ile Cys Val Gly Pro Asp Glu Gln Ala Pro 440 gag ggc tac gtc caa gac cca gat gtt cta gat acc tgg ttc tct tct 1507 Glu Gly Tyr Val Gln Asp Pro Asp Val Leu Asp Thr Trp Phe Ser Ser 455

gcç Ala 470	ז דיהו	g tgo ı Trp	g cca Pro	ttt Phe	tct Ser 475	Thr	atg Met	ggt Gly	tgg Trp	cca Pro 480	Glu	aag Lys	acc Thr	c cct	gag Glu 485	1555
Leu	g gag ı Glu	ı aaçı Lys	ttc Phe	tac Tyr 490	Pro	acc Thr	tcc Ser	gtg Val	ctg Leu 495	gtc Val	acc Thr	gcc Ala	tac Tyr	gac Asp 500	atc Ile	1603
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550	ALG	гуѕ	мес	ser	Lуs 555	tct Ser	Leu	Gly	Asn	Gly 560	Ile	Asp	Pro	Met	Asp 565	1795
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Leu Tyr Gln Gly Trp Val Asp Ala Gly Tyr Phe Thr Ala Asp Pro Ala 35 40 45

Ser Asp Lys Pro Gly Phe Ser Ile Val Leu Pro Pro Pro Asn Val Thr 50 55 60

Gly Gln Leu His Met Gly His Ala Leu Asp His Thr Leu Met Asp Ala 65 70 75 80

Leu Ala Arg Arg Lys Arg Met Gln Gly Phe Glu Val Leu Trp Leu Pro
85 90 95

Gly Met Asp His Ala Gly Ile Ala Thr Gln Thr Lys Val Glu Glu Met 100 $$ 105 $$ 110

Leu Lys Glu Thr Glu Gly Lys Thr Arg Tyr Asp Tyr Asp Arg Glu Glu 115 120 125

Phe Ile Ala Lys Val Trp Glu Trp Lys Gln Glu Tyr Gly Gly Lys Ile 130 135 140

Gly Glu Gln Met Arg Ala Ile Gly Asp Ser Val Asp Trp Ser Arg Glu 145 150 155 160

Arg Phe Thr Leu Asp Asp Gly Leu Ser Arg Ala Val Gln Thr Ile Phe 165 170 175

Lys Lys Leu Phe Asp Ala Gly Leu Ile Tyr Gln Ala Asn Arg Leu Val 180 185 190

Asn Trp Ser Pro Val Leu Glu Thr Ala Val Ser Asp Ile Glu Val Ile
195 200 205

Tyr Lys Asp Val Glu Gly Glu Leu Val Ser Ile Arg Tyr Gly Ser Leu 210 215 220

Asn Asp Asp Glu Pro His Val Ile Val Ala Thr Thr Arg Val Glu Thr 225 235 235

Met Leu Gly Asp Val Ala Val Ala Val His Pro Asp Asp Glu Arg Tyr 245 255

Lys Asp Leu Val Gly Gln Thr Leu Pro His Pro Phe Arg Asp Asp Leu 260 265 270

Ser Leu Lys Val Val Ala Asp Asp Tyr Val Asp Pro Glu Phe Gly Ser 275 280 285

Gly Ala Val Lys Ile Thr Pro Ala His Asp Pro Asn Asp Tyr Ala Leu 290 295 300

Gly Leu Arg His Asn Leu Asp Met Pro Thr Ile Met Asp Lys Thr Gly

305 310 320 Arg Ile Ala Asp Thr Gly Thr Gln Phe Asp Gly Leu Thr Arg Glu Glu Ala Arg Ile Lys Val Arg Glu Glu Leu Ala Ala Gln Gly Arg Ile Val Lys Glu Ile Arg Pro Tyr Val His Ser Val Gly His Ser Glu Arg Ser Gly Glu Ala Ile Glu Pro Arg Leu Ser Leu Gln Trp Phe Val Lys Val 375 Glu Glu Leu Ala Lys Met Ser Gly Asp Ala Val Arg Glu Gly Asp Thr 395 Thr Ile His Pro Lys Ser Leu Glu Pro Arg Tyr Phe Asp Trp Val Asp 410 Asn Met His Asp Trp Thr Ile Ser Arg Gln Leu Trp Trp Gly His Arg Ile Pro Ile Trp Tyr Gly Pro Asn Asp Glu Ile Ile Cys Val Gly Pro Asp Glu Gln Ala Pro Glu Gly Tyr Val Gln Asp Pro Asp Val Leu Asp Thr Trp Phe Ser Ser Ala Leu Trp Pro Phe Ser Thr Met Gly Trp Pro 475 Glu Lys Thr Pro Glu Leu Glu Lys Phe Tyr Pro Thr Ser Val Leu Val 490 Thr Ala Tyr Asp Ile Leu Phe Phe Trp Val Ala Arg Met Met Phe Gly Thr Phe Ala Ala Lys Glu Thr Pro Glu Leu Leu Gly Glu Gly Lys Asp Gly Arg Pro Gln Val Pro Phe Thr Asp Leu Phe Leu His Gly Leu Val Arg Asp Glu His Gly Arg Lys Met Ser Lys Ser Leu Gly Asn Gly Ile Asp Pro Met Asp Trp Val Glu Asn Tyr Gly Ala Asp Ala Leu Arg Phe Thr Leu Ala Arg Gly Ala Asn Pro Gly Val Asp Leu Pro Val Gly Glu Asp Ser Ala Gln Ser Ser Arg Asn Phe Ala Thr Lys Leu Phe Asn Ala Thr Lys Phe Ala Leu Met Asn Gly Ala Val Ser Glu Gly Leu Pro Ala Arg Glu Glu Leu Thr Asp Ala Asp Arg Trp Ile Val Asp Leu Leu

Glu Gln Val Arg Leu Asp Val Asp Ala Tyr Leu Asp Asn Tyr Gln Phe 645 650 655

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 Asn Asn Lys Leu Ala Asp Asp Ala Pro Gly Lys His Gly Arg Thr Gly
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 Glu Thr Gly Ala Gln Ala Ile Leu Ser Asn Ala Tyr His Leu Tyr Leu
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- gag aac tgg cac ggc ccc acc tac acc gac tcc ggc gga ttc cag gtc
 Glu Asn Trp His Gly Pro Thr Tyr Thr Asp Ser Gly Gly Phe Gln Val
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 110
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Tyr I				85					90					95		
Gly '			100					105					110			
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Lys 0					130					155					160	
Val I				165					170					175		
Ile G			100					185					190			
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Pro Arg His Leu Leu Gly Ile Ser Glu Pro Asp Asp Leu Phe Val Ala

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Val Asp Glu Ala Gly Gly Val Ser Ala Phe Glu Asn Trp His Gly Pro 50 55 60

Thr Tyr Thr Asp Ser Gly Gly Phe Gln Val Met Ser Leu Gly Ser Gly 65 70 75 80

Phe Lys Lys Val Leu Ala Met Asp Thr Thr Asn Leu Thr Arg Asn Asp 85 90 95

Ile Lys Ala Ala Lys Lys Glu Arg Met Ala Leu Val Asp Glu Asp Gly
100 105 110

Val Asp Phe Lys Ser Val Ile Asp Gly Ser Lys His Arg Phe Thr Pro 115 120 125

Glu Val Ser Met Gln Ile Gln His Gln Leu Gly Ala Asp Ile Ile Phe 130 135 140

Ala Phe Asp Glu Leu Thr Thr Leu Val Asp Thr Tyr Asp Tyr Gln Val 145 150 155 160

Glu Ser Val Glu Arg Thr Arg Arg Trp Ala Gln Arg Cys Leu Leu Glu 165 170 175

His Glu Arg Leu Thr Gln Glu Arg Val Asp Lys Pro Leu Gln Ser Leu 180 185 190

Trp Gly Val Val Gln Gly Ala Gln Phe Glu Asp Leu Arg Arg Gln Ala 195 200 205

Val Lys Gly Leu Leu Asp Leu Asp Arg Gln Ala Ala Asp Glu Gly Arg 210 215 220

Arg Gly Phe Gly Gly Phe Gly Ile Gly Gly Ala Leu Glu Lys Glu Asn 225 230 235 240

Leu Gly Thr Ile Val Gly Trp Val Cys Asp Glu Leu Pro Glu Asp Lys 245 250 255

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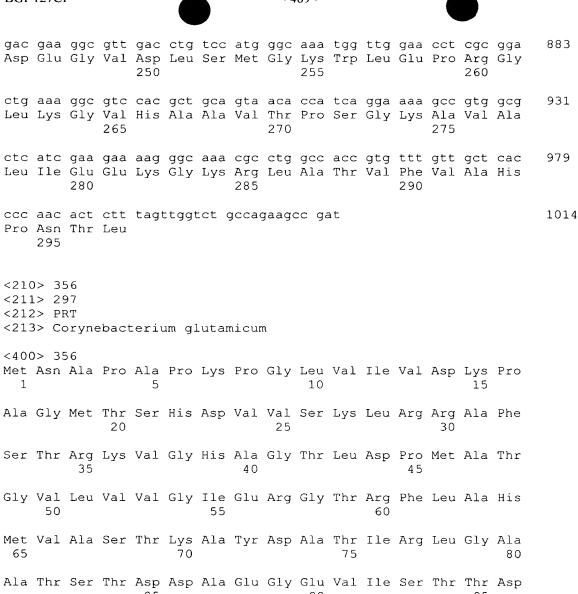
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Ser	Thr	Arg :	Lys '	Val	Gly	His .	Ala 40	Gly '	Thr	Leu	Asp	Pro 45	Met	Ala	Thr	
Gly	Val 50	Leu '	Val '	Val (Gly	Ile (Glu .	Arg (Gly '	Thr	Arg 60	Phe :	Leu	Ala	His	

Met Val Ala Ser Thr Lys Ala Tyr Asp Ala Thr Ile Arg Leu Gly Ala

65 75 80 Ala Thr Ser Thr Asp Asp Ala Glu Gly Glu Val Ile Ser Thr Thr Asp 85 90 Ala Ser Gly Leu Asp His Ser Thr Ile Leu Ala Glu Ile Val Asn Leu 105 Thr Gly Asp Ile Met Gln Lys Pro Thr Lys Val Ser Ala Ile Lys Ile 120 Asp Gly Lys Arg Ala His Glu Arg Val Arg Asp Gly Glu Glu Val Asp 135 Ile Pro Ala Arg Pro Val Thr Val Ser Val Phe Asp Val Leu Asp Tyr 155 His Val Asp Gly Glu Phe Tyr Asp Leu Asp Val Arg Val His Cys Ser 170 175 Ser Gly Thr Tyr Ile Arg Ala Leu Ala Arg Asp Leu Gly Asn Ala Leu 185 Gln Val Gly Gly His Leu Thr Ala Leu Arg Arg Thr Glu Val Gly Pro 200 205 Phe Thr Leu Asn Asp Ala Thr Pro Leu Ser Lys Leu Gln Glu Asn Pro 215 Glu Leu Ser Leu Asn Leu Asp Gln Ala Leu Thr Arg Ser Tyr Pro Val 230 235 Leu Asp Ile Thr Glu Asp Glu Gly Val Asp Leu Ser Met Gly Lys Trp 250 Leu Glu Pro Arg Gly Leu Lys Gly Val His Ala Ala Val Thr Pro Ser 260 265 Gly Lys Ala Val Ala Leu Ile Glu Glu Lys Gly Lys Arg Leu Ala Thr 280 285 Val Phe Val Ala His Pro Asn Thr Leu 290 295 <210> 355 <211> 1014 <212> DNA <213> Corynebacterium glutamicum <220> <221> CDS <222> (101)..(991) <223> FRXA01490 <400> 355 cacaccaatg gtgactactg atccttgaag atcagccgga acgctgtcta gtccactcca 60 aatatccact gttttagact acggcataga ctcaacagac atg aat gct cct gcc 115 Met Asn Ala Pro Ala 1

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cat His	gac Asp	gto Val	g gto Val 25	. Ser	aaa Lys	ı ttg : Leu	cgc Arg	cgc Arg 30	Ala	ttt Phe	tcc Ser	acc Thr	e ego Arg 35	Lys	gta Val	211
ggc Gly	cac	gca Ala 40	GTA	acc Thr	cto Leu	gac Asp	ecc Pro 45	Met	gca Ala	acc Thr	: ggc	gtg Val	Leu	gto Val	gtc Val	259
gga Gly	att Ile 55	GIU	cgc Arg	gga Gly	acc Thr	cgc Arg 60	ttc Phe	ctg Leu	gca Ala	cac His	atg Met 65	gtg Val	gcc Ala	tcc Ser	acc Thr	307
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cac His	agc Ser	acc Thr	atc Ile 105	ctt Leu	gct Ala	gaa Glu	atc Ile	gtc Val 110	aac Asn	ctc Leu	acc Thr	ggc Gly	gac Asp 115	atc Ile	atg Met	451
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gcg (Ala '	acc Thr 215	ccc Pro	ctc Leu	tcc Ser	aaa Lys	ctc Leu 220	caa Gln	gag Glu	aat Asn	cca Pro	gaa Glu 225	ctc Leu	tcc Ser	ctc Leu	aac Asn	787
ctc d Leu / 230	gac Asp	cag Gln	gca Ala	Leu	acc Thr 235	cgc Arg	agt Ser	tac Tyr	Pro	gtc Val 240	ctt Leu	gac Asp	atc Ile	acc Thr	gaa Glu 245	835



Ala Ser Gly Leu Asp His Ser Thr Ile Leu Ala Glu Ile Val Asn Leu 100

Thr Gly Asp Ile Met Gln Lys Pro Thr Lys Val Ser Ala Ile Lys Ile 115

Asp Gly Lys Arg Ala His Glu Arg Val Arg Asp Gly Glu Glu Val Asp 130

Ile Pro Ala Arg Pro Val Thr Val Ser Val Phe Asp Val Leu Asp Tyr 150

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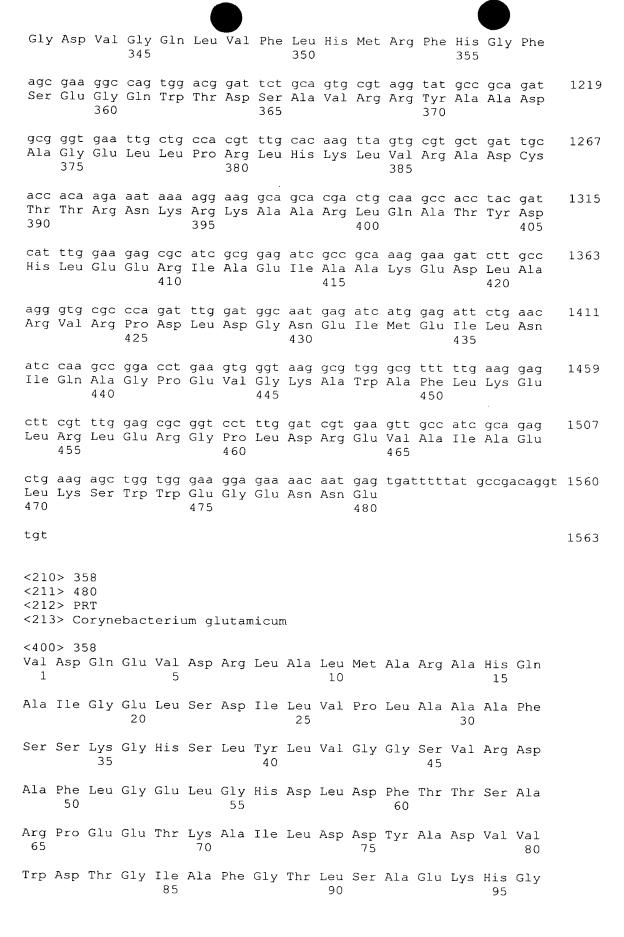
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N

W

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Gln Gln Ile Glu Ile Thr Thr Phe Arg Ser Asp Leu Tyr Asp Gly Asn Ser Arg Asn Pro Glu Val Thr Phe Gly Asp Thr Leu Glu Gly Asp Leu Ile Arg Arg Asp Phe Lys Val Asn Ala Met Ala Val Glu Ile Gln Ala Asp Gly Glu Leu Thr Phe His Asp Pro Val Gly Gly Leu Glu Asp Leu 155 Leu Thr His Thr Leu Asp Thr Pro Ala Thr Pro Glu Gln Ser Phe Asn 170 Asp Asp Pro Leu Arg Met Leu Arg Ala Ala Arg Phe Val Ser Gln Leu 185 Asn Phe Thr Leu Ala Pro Arg Val Ile Thr Ala Met Thr Glu Met Ala 205 Gln Gln Ile Thr Arg Ile Thr Val Glu Arg Met Gln Val Glu Leu Asp Lys Met Ile Leu Gly Lys Asn Pro Glu Ala Gly Ile Asp Leu Met Val 235 Glu Ser Gly Ile Ala Gln Ile Ile Tyr Pro Glu Ile Pro Ala Met Gln 250 Met Thr Gln Asp Glu His Met Gln His Lys Asp Val Tyr Ala His Ser 265 Leu Gln Val Met Arg Gln Ala Ile Asp Gln Glu Glu Asp Gly Pro Asp 280 Leu Val Leu Arg Trp Ala Ala Leu Leu His Asp Cys Gly Lys Pro Asp Thr Arg Asp Phe Asn Glu Glu Gly Arg Val Ser Phe His Gln His Glu 315 Val Val Gly Ala Lys Leu Val Arg Arg Arg Met Arg Lys Leu Lys Tyr Ser Lys Gln Met Val Gly Asp Val Gly Gln Leu Val Phe Leu His Met 345 Arg Phe His Gly Phe Ser Glu Gly Gln Trp Thr Asp Ser Ala Val Arg Arg Tyr Ala Ala Asp Ala Gly Glu Leu Leu Pro Arg Leu His Lys Leu Val Arg Ala Asp Cys Thr Thr Arg Asn Lys Arg Lys Ala Ala Arg Leu 395 Gln Ala Thr Tyr Asp His Leu Glu Glu Arg Ile Ala Glu Ile Ala Ala 410

Lys Glu Asp Leu Ala Arg Val Arg Pro Asp Leu Asp Gly Asn Glu Ile
420 425 430

Met Glu Ile Leu Asn Ile Gln Ala Gly Pro Glu Val Gly Lys Ala Trp 435 440 445

Ala Phe Leu Lys Glu Leu Arg Leu Glu Arg Gly Pro Leu Asp Arg Glu 450 455 460

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tgc tgt gac tat gca gaa ctc aac cca act gtg gag ctt gag atc aag 144 Cys Cys Asp Tyr Ala Glu Leu Asn Pro Thr Val Glu Leu Glu Ile Lys

tcc cgc gtg ctt cgt gat cag ttg gag cgc atc ggt gga atc gat gag 192 Ser Arg Val Leu Arg Asp Gln Leu Glu Arg Ile Gly Gly Ile Asp Glu 50 60

ctt cct gaa ttt gag ctt caa gat ctg gag cca aca gct ggt tgg cgt 240 Leu Pro Glu Phe Glu Leu Gln Asp Leu Glu Pro Thr Ala Gly Trp Arg 65 70 75 80

acc cgc gtt cgc ctc ggc gtt gat gcg tct ggt cgt gcc ggg ttc cgc 288
Thr Arg Val Arg Leu Gly Val Asp Ala Ser Gly Arg Ala Gly Phe Arg
85 90 95

aag ctg aag tcc aat gag ttg gtt act gag gtt gcg tgt tct cag gtt Lys Leu Lys Ser Asn Glu Leu Val Thr Glu Val Ala Cys Ser Gln Val 100 105 110

gtg cca gag ctt ctt gag ggc ctt gtg ggt gag ggc gct cgt cgt ttc 384
Val Pro Glu Leu Glu Gly Leu Val Gly Glu Gly Ala Arg Arg Phe

acc cct ggc gtg gag atc att gca gct att gat gat gcg ggt cag cgc 432 Thr Pro Gly Val Glu Ile Ile Ala Ala Ile Asp Asp Ala Gly Gln Arg

130

135 140 cac gtt gtg gaa tcc cgt aag gct cct cgt ggt cgt cgt act gaa act 480 His Val Val Glu Ser Arg Lys Ala Pro Arg Gly Arg Arg Thr Glu Thr 150 155 gtg ttg aag gtg ctg gaa ggc act ggc gag gtg gag cag aag gta ggc 528 Val Leu Lys Val Leu Glu Gly Thr Gly Glu Val Glu Gln Lys Val Gly 165 170 gat tac acc tgg aag ttc cca gtt tct tcc ttc tgg cag gcg cac acc 576 Asp Tyr Thr Trp Lys Phe Pro Val Ser Ser Phe Trp Gln Ala His Thr 180 185 aag gcc cct gcg gcg tat tca gag ttc atc gcc gaa gcg tta acc gga 624 Lys Ala Pro Ala Ala Tyr Ser Glu Phe Ile Ala Glu Ala Leu Thr Gly 195 200 ttg gaa ctg gtt gac gtc gat aag cgt ggc cct gtt gcg tgg gac ctt 672 Leu Glu Leu Val Asp Val Asp Lys Arg Gly Pro Val Ala Trp Asp Leu 210 215 tat ggc ggc gtc ggc ctg ttc gcg ccg att atc acc agc aag ctg cag 720 Tyr Gly Gly Val Gly Leu Phe Ala Pro Ile Ile Thr Ser Lys Leu Gln 225 230 235 gca gct gtc cac tct gtg gag ctg tcc cca ggt tca gcg gag gct ggc 768 Ala Ala Val His Ser Val Glu Leu Ser Pro Gly Ser Ala Glu Ala Gly 245 gaa gag gcg ttg gct ggt ttg cct gtc act ttc cac act ggt cgg gta 816 Glu Glu Ala Leu Ala Gly Leu Pro Val Thr Phe His Thr Gly Arg Val 260 gag ggc atg gcg tcc cag ctg cct tcg cca aac gtg gtt gtt ttg gat 864 Glu Gly Met Ala Ser Gln Leu Pro Ser Pro Asn Val Val Leu Asp 275 cct cct cgc acc ggt gca ggc agt gac gtg ttg aag agc atc gcg gag 912 Pro Pro Arg Thr Gly Ala Gly Ser Asp Val Leu Lys Ser Ile Ala Glu 290 295 gct aag cct cag ctg gtt atc cac att ggt tgt gac ccg gcg act ttc 960 Ala Lys Pro Gln Leu Val Ile His Ile Gly Cys Asp Pro Ala Thr Phe 305 310 gct cgc gac gtt gcc gat tgg aag ctc aac ggc tac gaa atg gat caa 1008 Ala Arg Asp Val Ala Asp Trp Lys Leu Asn Gly Tyr Glu Met Asp Gln ttg gct gtt ttt aac gcg ttc cct gga act cac cac ttt gag acg att 1056 Leu Ala Val Phe Asn Ala Phe Pro Gly Thr His His Phe Glu Thr Ile 340 ggt gta ttt gtc cgc gtt tcc taaggcggat taagccttgg cta 1100 Gly Val Phe Val Arg Val Ser 355

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Cys Cys Asp Tyr Ala Glu Leu Asn Pro Thr Val Glu Leu Glu Ile Lys 35 40 45

Ser Arg Val Leu Arg Asp Gln Leu Glu Arg Ile Gly Gly Ile Asp Glu 50 55 60

Leu Pro Glu Phe Glu Leu Gln Asp Leu Glu Pro Thr Ala Gly Trp Arg 65 70 75 80

Thr Arg Val Arg Leu Gly Val Asp Ala Ser Gly Arg Ala Gly Phe Arg 85 90 95

Lys Leu Lys Ser Asn Glu Leu Val Thr Glu Val Ala Cys Ser Gln Val 100 105 110

Val Pro Glu Leu Leu Glu Gly Leu Val Gly Glu Gly Ala Arg Arg Phe 115 120 125

Thr Pro Gly Val Glu Ile Ile Ala Ala Ile Asp Asp Ala Gly Gln Arg 130 135 140

His Val Val Glu Ser Arg Lys Ala Pro Arg Gly Arg Arg Thr Glu Thr 145 150 155 160

Val Leu Lys Val Leu Glu Gly Thr Gly Glu Val Glu Gln Lys Val Gly 165 170 175

Asp Tyr Thr Trp Lys Phe Pro Val Ser Ser Phe Trp Gln Ala His Thr 180 185 190

Lys Ala Pro Ala Ala Tyr Ser Glu Phe Ile Ala Glu Ala Leu Thr Gly 195 200 205

Leu Glu Leu Val Asp Val Asp Lys Arg Gly Pro Val Ala Trp Asp Leu 210 215 220

Tyr Gly Gly Val Gly Leu Phe Ala Pro Ile Ile Thr Ser Lys Leu Gln 235 240

Ala Ala Val His Ser Val Glu Leu Ser Pro Gly Ser Ala Glu Ala Gly 245 250 255

Glu Glu Ala Leu Ala Gly Leu Pro Val Thr Phe His Thr Gly Arg Val 260 265 270

Glu Gly Met Ala Ser Gln Leu Pro Ser Pro Asn Val Val Leu Asp 275 280 285

Pro Pro Arg Thr Gly Ala Gly Ser Asp Val Leu Lys Ser Ile Ala Glu 290 295 300



Ala Lys Pro Gln Leu Val Ile His Ile Gly Cys Asp Pro Ala Thr Phe 305 310 315 320

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ctt gtg ggt gag ggc gct cgt cgt ttc acc cct ggc gtg gag atc att 144
Leu Val Gly Glu Gly Ala Arg Arg Phe Thr Pro Gly Val Glu Ile Ile
35 40

gca gct att gat gcg ggt cag cgc cac gtt gtg gaa tcc cgt aag 192 Ala Ala Ile Asp Asp Ala Gly Gln Arg His Val Val Glu Ser Arg Lys

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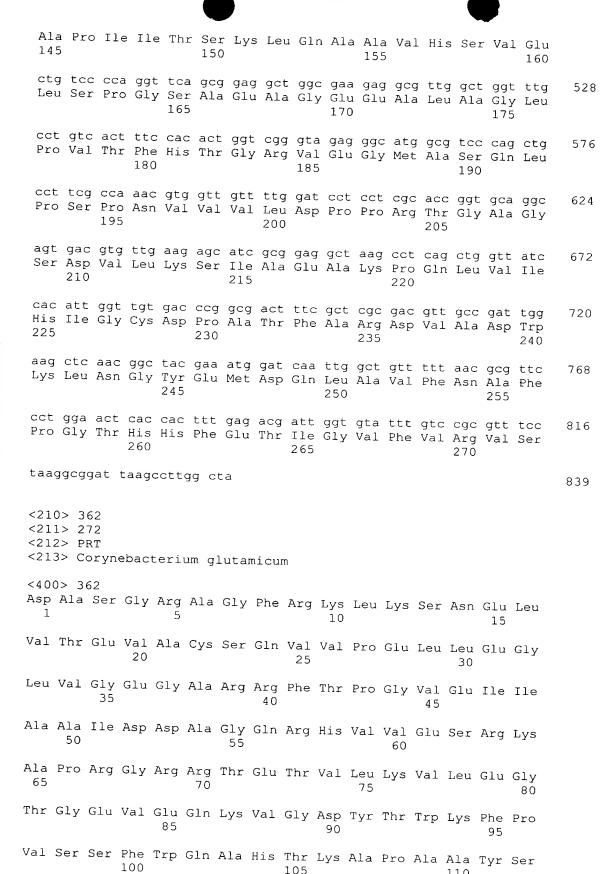
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gag ttc atc gcc gaa gcg tta acc gga ttg gaa ctg gtt gac gtc gat 384 Glu Phe Ile Ala Glu Ala Leu Thr Gly Leu Glu Leu Val Asp Val Asp 115 120 125

aag cgt ggc cct gtt gcg tgg gac ctt tat ggc ggc gtc ggc ctg ttc 432 Lys Arg Gly Pro Val Ala Trp Asp Leu Tyr Gly Gly Val Gly Leu Phe 130 135 140

gcg ccg att atc acc agc aag ctg cag gca gct gtc cac tct gtg gag 480



Glu Phe Ile Ala Glu Ala Leu Thr Gly Leu Glu Leu Val Asp Val Asp 115 Lys Arg Gly Pro Val Ala Trp Asp Leu Tyr Gly Gly Val Gly Leu Phe Ala Pro Ile Ile Thr Ser Lys Leu Gln Ala Ala Val His Ser Val Glu 155 Leu Ser Pro Gly Ser Ala Glu Ala Gly Glu Glu Ala Leu Ala Gly Leu Pro Val Thr Phe His Thr Gly Arg Val Glu Gly Met Ala Ser Gln Leu 185 Pro Ser Pro Asn Val Val Leu Asp Pro Pro Arg Thr Gly Ala Gly Ser Asp Val Leu Lys Ser Ile Ala Glu Ala Lys Pro Gln Leu Val Ile 215 His Ile Gly Cys Asp Pro Ala Thr Phe Ala Arg Asp Val Ala Asp Trp 230 235 Lys Leu Asn Gly Tyr Glu Met Asp Gln Leu Ala Val Phe Asn Ala Phe 245 250 Pro Gly Thr His His Phe Glu Thr Ile Gly Val Phe Val Arg Val Ser 260 265 <210> 363 <211> 942 <212> DNA <213> Corynebacterium glutamicum <220> <221> CDS <222> (101)..(919) <223> RXA02523 <400> 363 agtgtgtgag gcttcatgcc tccagcgtag acctcttggt agattgaagt ccgtgactag 60 ctccgaaaat cttgattccc accgtctgcg gcttgatgtc gtg acc att ttc ccc 115 Val Thr Ile Phe Pro gaa tac ctg gat cct ctg cgc cat gcc ctg ctg ggt aag gcg att gag 163 Glu Tyr Leu Asp Pro Leu Arg His Ala Leu Leu Gly Lys Ala Ile Glu gat ggc att ttg gaa gtc ggt gtt cat gat ctt cgg aat tgg gcg acc 211 Asp Gly Ile Leu Glu Val Gly Val His Asp Leu Arg Asn Trp Ala Thr ggc gga cac aag gcc gtc gac gat acc ccg tat ggc ggt ggc ccg ggc Gly Gly His Lys Ala Val Asp Asp Thr Pro Tyr Gly Gly Pro Gly

40 45 50 atg gtg atg aag cca gag gtc tgg ggg cca gcg ctt gat gtc gcc 307 Met Val Met Lys Pro Glu Val Trp Gly Pro Ala Leu Asp Asp Val Ala gca ggc cgg gtg agc ggt gcg gaa ctc gat tcg gcc tcg ctg cac ctg 355 Ala Gly Arg Val Ser Gly Ala Glu Leu Asp Ser Ala Ser Leu His Leu 75 aaa aat gtg cgc cat gat gag ctg ggt ggc gtc gaa aag cgt gct tat 403 Lys Asn Val Arg His Asp Glu Leu Gly Gly Val Glu Lys Arg Ala Tyr 90 gtc gtg gaa gaa gac cgc gac ctg ccg ctg ttg ctg gtg ccc acc ccg 451 Val Val Glu Glu Asp Arg Asp Leu Pro Leu Leu Val Pro Thr Pro 105 110 gct ggc aag ccg ttc acg cag gcg gat gcg cag gcg tgg tcc aac gag 499 Ala Gly Lys Pro Phe Thr Gln Ala Asp Ala Gln Ala Trp Ser Asn Glu 120 gag cac att gtg ttc gcg tgc ggg cgc tac gag ggc att gac cag cgc 547 Glu His Ile Val Phe Ala Cys Gly Arg Tyr Glu Gly Ile Asp Gln Arg 135 gtt att gat gat gcc gcc aac cgc tac cgc gtg cgc gag gta tcg atc 595 Val Ile Asp Asp Ala Ala Asn Arg Tyr Arg Val Arg Glu Val Ser Ile 150 ggc gat tat gtg ctg atc ggc ggg gaa gtg gca gtc ctg gtc atc gcg Gly Asp Tyr Val Leu Ile Gly Gly Glu Val Ala Val Leu Val Ile Ala 170 gaa gcc gtc gtg cgc ctg atc cct ggc gtg ctc gga aac cgt cgt agc 691 Glu Ala Val Val Arg Leu Ile Pro Gly Val Leu Gly Asn Arg Arg Ser 185 cac gaa gaa gac agc ttc tcc gat ggc ctg ctc gaa ggc ccg tcg tac 739 His Glu Glu Asp Ser Phe Ser Asp Gly Leu Leu Glu Gly Pro Ser Tyr 200 aca aag ccg cgc acc tgg cgc gga ctt gac gtc ccc gaa gta cta ttc 787 Thr Lys Pro Arg Thr Trp Arg Gly Leu Asp Val Pro Glu Val Leu Phe 215 teg ggc aac cac gcc aag gtc gat egc tgg ega egc gat eag geg etc Ser Gly Asn His Ala Lys Val Asp Arg Trp Arg Arg Asp Gln Ala Leu 230 235 240 cta ege ace eag gea att agg eet gag ett ate gae gea tee ete 883 Leu Arg Thr Gln Ala Ile Arg Pro Glu Leu Ile Asp Ala Ser Leu Leu 255 gat tee ace gae etc aaa gta ttg gga etg gae aaa tgacagagae 929 Asp Ser Thr Asp Leu Lys Val Leu Gly Leu Asp Lys cacacctcaa ccc 942

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<400> 364

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20 25 30

Arg Asn Trp Ala Thr Gly Gly His Lys Ala Val Asp Asp Thr Pro Tyr 35 40 45

Gly Gly Gly Pro Gly Met Val Met Lys Pro Glu Val Trp Gly Pro Ala 50 55 60

Leu Asp Asp Val Ala Ala Gly Arg Val Ser Gly Ala Glu Leu Asp Ser 65 70 75 80

Glu Lys Arg Ala Tyr Val Val Glu Glu Asp Arg Asp Leu Pro Leu Leu 100 105 110

Leu Val Pro Thr Pro Ala Gly Lys Pro Phe Thr Gln Ala Asp Ala Gln
115 120 125

Ala Trp Ser Asn Glu Glu His Ile Val Phe Ala Cys Gly Arg Tyr Glu 130 135 140

Gly Ile Asp Gln Arg Val Ile Asp Asp Ala Ala Asn Arg Tyr Arg Val 145 150 155 160

Arg Glu Val Ser Ile Gly Asp Tyr Val Leu Ile Gly Gly Glu Val Ala 165 170 175

Val Leu Val Ile Ala Glu Ala Val Val Arg Leu Ile Pro Gly Val Leu 180 185 190

Gly Asn Arg Arg Ser His Glu Glu Asp Ser Phe Ser Asp Gly Leu Leu 195 200 205

Glu Gly Pro Ser Tyr Thr Lys Pro Arg Thr Trp Arg Gly Leu Asp Val 210 215 220

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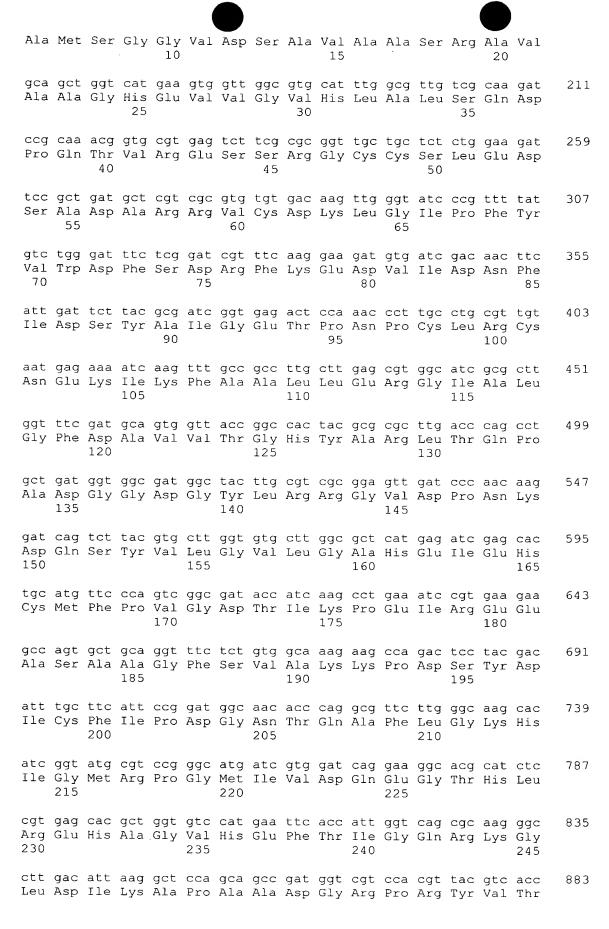
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gcc gga act co Ala Gly Thr Pr	g gaa cct gc o Glu Pro Al 10	a gtg gtg a Val Val	gca ctg Ala Leu 15	caa aag Gln Lys	ctc att Leu Ile 20	gat 163 Asp									
tcc gat cat ga Ser Asp His Gl 2	g gtc gtc gc u Val Val Al 5	t gtg ttg a Val Leu 30	acg caa Thr Gln	cca gat Pro Asp	gca cgt Ala Arg 35	cgc 211 Arg									
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cag cac ggt at Gln His Gly Il 55	t gag gtg tt e Glu Val Le 6	u Lys Pro	acc tcc Thr Ser	ctg aag Leu Lys 65	gct gat Ala Asp	acg 307 Thr									
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gat gtt gcg cc Asp Val Ala Pr 10	o His Gly $\mathtt{Tr}_{\mathtt{I}}$	g gtg aat p Val Asn 110	ctg cac Leu His	ttt tct Phe Ser	ttg ctt Leu Leu 115	cct 451 Pro									
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					cct Pro 235											835
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gac Asp	ttg Leu	gcg Ala	cct Pro 265	ggc Gly	gcc Ala	atc Ile	ctg Leu	gcg Ala 270	caa Gln	aag Lys	aac Asn	tcc Ser	gtg Val 275	gtg Val	gtc Val	931
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1	Arg	Leu	val	Fne 5	Ala	GIÀ	Tnr	Pro	10	Pro	Ala	Val	Val	15	Leu	
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Glu	Leu	Ala	Pro	Asp 85	Cys	Leu	Pro	Val	Val 90	Ala	Tyr	Gly	Gln	Leu 95	Ile	

Thr Lys Asp Leu Leu Asp Val Ala Pro His Gly Trp Val Asn Leu His Phe Ser Leu Leu Pro Ala Trp Arg Gly Ala Ala Pro Val Gln Ala Ser 115 Ile Arg Glu Gly Asp Gln Ile Thr Gly Ala Thr Thr Phe Arg Ile Asp Glu Gly Leu Asp Thr Gly Val Ile Leu Ser Thr Ile Glu Asp Thr Ile 155 Gln Pro Thr Asp Thr Ala Asp Asp Leu Leu Thr Arg Leu Ala Tyr Ser 170 Gly Gly Asp Leu Leu Val Glu Thr Met Thr Gly Leu Glu Gln Gly Thr 185 Ile Thr Pro Arg Ala Gln Glu Gly Glu Ala Thr Tyr Ala Ser Lys Ile 200 Thr Thr Gln Asp Ala Gln Ile Asp Trp Ser Lys Pro Ala Glu Val Ile 215 Asp Arg His Ile Arg Ala His Thr Pro Gly Pro Gly Ala Trp Thr Thr 235 Leu Val Asp Ala Arg Leu Lys Val Gly Pro Ile Ser His Ser Gly Glu 245 250 255 Val Glu Val Ala Ala Asp Leu Ala Pro Gly Ala Ile Leu Ala Gln Lys 265 Asn Ser Val Val Gly Thr Gly Thr Thr Pro Ile Val Leu Gly Asn 280 285 Ile Gln Pro Pro Gly Lys Lys Met Met Asn Ala Ala Asp Trp Ala Arg 295 300 Gly Val Gln Leu Asp Gln Glu Ala Lys Phe Gln 310 <210> 367 <211> 1218 <212> DNA <213> Corynebacterium glutamicum <220> <221> CDS <222> (101)..(1195) <223> RXA00217 <400> 367 ccaaataaaa gaaattcggg atttcgggaa catgcggata cgctacgttg ttgagattaa 60 ttaagtaaac gtaggcagaa agctttgtag aggggagatc atg cgg gtt ctt gca 115 Met Arg Val Leu Ala gca atg agt gga ggc gtt gat tee gee gte geg geg tea ege geg gte 163



250 255 gat att gat gcc aag acc ggc acc gtc acc gtt ggt act cgc gaa aac 931 Asp Ile Asp Ala Lys Thr Gly Thr Val Thr Val Gly Thr Arg Glu Asn 270 cta aag atc agc acc atc cac gcc gat cgt ttg aag ttc ctc cat cca 979 Leu Lys Ile Ser Thr Ile His Ala Asp Arg Leu Lys Phe Leu His Pro 285 290 gcg atg gac gga cag atc gat tgc gaa gtc cag gtc cgc gca cac ggt 1027 Ala Met Asp Gly Gln Ile Asp Cys Glu Val Gln Val Arg Ala His Gly 295 300 305 gga gta gtt tcc tgc tct gcg acg att gat cgt gac gct gat ttc atg 1075 Gly Val Val Ser Cys Ser Ala Thr Ile Asp Arg Asp Ala Asp Phe Met 310 315 320 gtg ctc aac ctc aat gaa cct ctt cag ggt gtt gct cgc ggc cag gca 1123 Val Leu Asn Leu Asn Glu Pro Leu Gln Gly Val Ala Arg Gly Gln Ala 330 335 gca gtg ctg tac ctg cct gac gcg gat ggt gac atc gtt ctt gga tca 1171 Ala Val Leu Tyr Leu Pro Asp Ala Asp Gly Asp Ile Val Leu Gly Ser 345 350 ggc acc atc tgc cac acg gag tct taagaaaatt gggcgcttat ggt 1218 Gly Thr Ile Cys His Thr Glu Ser 360 <210> 368 <211> 365 <212> PRT <213> Corynebacterium glutamicum Met Arg Val Leu Ala Ala Met Ser Gly Gly Val Asp Ser Ala Val Ala Ala Ser Arg Ala Val Ala Ala Gly His Glu Val Val Gly Val His Leu 25 Ala Leu Ser Gln Asp Pro Gln Thr Val Arg Glu Ser Ser Arg Gly Cys Cys Ser Leu Glu Asp Ser Ala Asp Ala Arg Arg Val Cys Asp Lys Leu Gly Ile Pro Phe Tyr Val Trp Asp Phe Ser Asp Arg Phe Lys Glu Asp Val Ile Asp Asn Phe Ile Asp Ser Tyr Ala Ile Gly Glu Thr Pro Asn Pro Cys Leu Arg Cys Asn Glu Lys Ile Lys Phe Ala Ala Leu Leu Glu Arg Gly Ile Ala Leu Gly Phe Asp Ala Val Val Thr Gly His Tyr Ala 120

Arg Leu Thr Gln Pro Ala Asp Gly Gly Asp Gly Tyr Leu Arg Arg Gly 135 Val Asp Pro Asn Lys Asp Gln Ser Tyr Val Leu Gly Val Leu Gly Ala 150 His Glu Ile Glu His Cys Met Phe Pro Val Gly Asp Thr Ile Lys Pro 165 Glu Ile Arg Glu Glu Ala Ser Ala Ala Gly Phe Ser Val Ala Lys Lys Pro Asp Ser Tyr Asp Ile Cys Phe Ile Pro Asp Gly Asn Thr Gln Ala Phe Leu Gly Lys His Ile Gly Met Arg Pro Gly Met Ile Val Asp Gln 215 220 Glu Gly Thr His Leu Arg Glu His Ala Gly Val His Glu Phe Thr Ile 230 235 Gly Gln Arg Lys Gly Leu Asp Ile Lys Ala Pro Ala Ala Asp Gly Arg 245 250 Pro Arg Tyr Val Thr Asp Ile Asp Ala Lys Thr Gly Thr Val Thr Val 265 Gly Thr Arg Glu Asn Leu Lys Ile Ser Thr Ile His Ala Asp Arg Leu 275 280 285 Lys Phe Leu His Pro Ala Met Asp Gly Gln Ile Asp Cys Glu Val Gln 295 Val Arg Ala His Gly Gly Val Val Ser Cys Ser Ala Thr Ile Asp Arg 310 315 Asp Ala Asp Phe Met Val Leu Asn Leu Asn Glu Pro Leu Gln Gly Val 325 330 Ala Arg Gly Gln Ala Ala Val Leu Tyr Leu Pro Asp Ala Asp Gly Asp 340 345 Ile Val Leu Gly Ser Gly Thr Ile Cys His Thr Glu Ser 355 360 <210> 369 <211> 735 <212> DNA <213> Corynebacterium glutamicum <220> <221> CDS <222> (101)..(712) <223> RXA01223 <400> 369 gcgggagtgg acgggccgcc agccatcggg gcgacaatca cgggagtttt caacgtgtca 60

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Met Thr Ser Val Ser

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					ggc Gly											403
					cgc Arg											451
					cgc Arg											499
					ctc Leu											547
					att Ile 155											595
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35 40 ctg tgt gac ttc ttt aag att tcc cca gcc aat gtc atc gtg gtg cat 194 Leu Cys Asp Phe Phe Lys Ile Ser Pro Ala Asn Val Ile Val Val His gat gaa ttg gag ctt gat ttc ggc tca gtg aag cta cgt cag ggt ggc 242 Asp Glu Leu Glu Leu Asp Phe Gly Ser Val Lys Leu Arg Gln Gly Gly 70 ggg gat cat ggg cac aat ggt ctg aaa tcc acg tcc aaa tct ttg gga 290 Gly Asp His Gly His Asn Gly Leu Lys Ser Thr Ser Lys Ser Leu Gly 85 act aag gac tat tgg aag ctc agc atg ggt atc ggt agg cca ccg ggt 338 Thr Lys Asp Tyr Trp Lys Leu Ser Met Gly Ile Gly Arg Pro Pro Gly 100 cgg atg gat ccg gca agt ttt gtg ttg aag cct ttt ggc aag caa gaa 386 Arg Met Asp Pro Ala Ser Phe Val Leu Lys Pro Phe Gly Lys Gln Glu 115 ctg gcg gat att ccc atc atg gcg gct gac gct gca gat ctc gtc gaa 434 Leu Ala Asp Ile Pro Ile Met Ala Ala Asp Ala Ala Asp Leu Val Glu 130 135 aag cat ttg cag cag ggc tagctacttg cgccgcgcct ctt 475 Lys His Leu Gln Gln Gly 145 <210> 372 <211> 148 <212> PRT <213> Corynebacterium glutamicum <400> 372 Ala Glu Glu Leu Val Ser Arg Ser Phe Gly Ser Phe Ser Val His Lys Arg Ser Asn Thr Asp Ile Ala Gln Leu Pro Gly Leu Ile Val Ala Lys Pro Arg Ser Phe Met Asn Leu Ser Gly Thr Pro Ile Arg Ala Leu Cys 35 Asp Phe Phe Lys Ile Ser Pro Ala Asn Val Ile Val Val His Asp Glu Leu Glu Leu Asp Phe Gly Ser Val Lys Leu Arg Gln Gly Gly Asp 65 70 His Gly His Asn Gly Leu Lys Ser Thr Ser Lys Ser Leu Gly Thr Lys Asp Tyr Trp Lys Leu Ser Met Gly Ile Gly Arg Pro Pro Gly Arg Met 105 Asp Pro Ala Ser Phe Val Leu Lys Pro Phe Gly Lys Gln Glu Leu Ala 115 120

- 491 -

Asp Ile Pro Ile Met Ala Ala Asp Ala Ala Asp Leu Val Glu Lys His

Leu Gln Gln Gly 145

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ctg gca ggt ctt att cat tcc cgc gag gta act tcc cgc gag gtt act 211 Leu Ala Gly Leu Ile His Ser Arg Glu Val Thr Ser Arg Glu Val Thr 25 30 35

caa gcg cac cta gat cgc att gct gcg gtt gac ggc gat att cat gca 259
Gln Ala His Leu Asp Arg Ile Ala Ala Val Asp Gly Asp Ile His Ala
40 45

ttt ctc cac gtt ggc cag gag gac ctg aac gcg gcg gat gac gtc 307 Phe Leu His Val Gly Gln Glu Glu Ala Leu Asn Ala Ala Asp Asp Val

gat aag cgt cta gac gct gga gag gca cct gcc tcg gct ttg gct ggc 355 Asp Lys Arg Leu Asp Ala Gly Glu Ala Pro Ala Ser Ala Leu Ala Gly 70 75 80

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105 110 115

act gtg acc cgc aag atc cgt gag gct ggc atc cca att ttg ggt aag 499
Thr Val Thr Arg Lys Ile Arg Glu Ala Gly Ile Pro Ile Leu Gly Lys
120 125 130

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Thr Asn Met Asp Glu Phe Ala Met Gly Ser Ser Thr Glu Asn Ser Ala
135 140 145

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	att Ile															691
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	ctg Leu 215															787
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	gct Ala															883
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	gtg Val															979
	gca Ala 295															1027
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	atg Met															1171
	gag Glu															1219
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	cca Pro															1411
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Gly	Asp 50	Ile	His	Ala	Phe	Leu 55	His	Val	Gly	Gln	Glu 60	Glu	Ala	Leu	Asn	
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Ser	Ala	Leu	Ala	Gly 85	Val	Pro	Leu	Ala	Leu 90		Asp	Val	Phe	Thr 95		
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Ser	Pro	Tyr 115	Asp	Ala	Thr	Val	Thr 120	Arg	Lys	Ile	Arg	Glu 125		Gly	Ile	
Pro	Ile 130	Leu	Gly	Lys	Thr	Asn 135		Asp	Glu	Phe	Ala 140		Gly	Ser	Ser	

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Ser His Pro His Ser Ile Ala Thr Thr Met Arg Glu Asp Val Val His 55

aag acc ctc gat gct gcg gct gcg ttg gac caa gcg ccc gct gtc gag 355

Lys Thr Leu Asp Ala Ala Ala Ala Leu Asp Gln Ala Pro Ala Val Glu 70

75

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95

taataattat gaccaacaag tac 420

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<211> 99

<212> PRT

<213> Corynebacterium glutamicum

<400> 376

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200

215

210

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1171

1219

1260

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Pro	Val 55	Ser	Leu	Gly	Leu	Pro 60	Gly	Ala	Leu	Pro	Val 65	Val	Asn	Ala	Lys	
	gtg				att Ile 75	aag					ctg					355
					ttt Phe											403
					atc Ile											451
					gtt Val											499
					atg Met											547
					cgt Arg 155											595
					gtc Val											643
					cgc Arg											691
					gtt Val											739
					cgt Arg											787
					ggc Gly 235											835
ctg Leu	aag Lys	tcc Ser	gtt Val	gag Glu 250	cag Gln	gcc Ala	agc Ser	acc Thr	ttt Phe 255	gag Glu	atg Met	cag Gln	cgc Arg	cag Gln 260	gct Ala	883
cag Gln																886

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